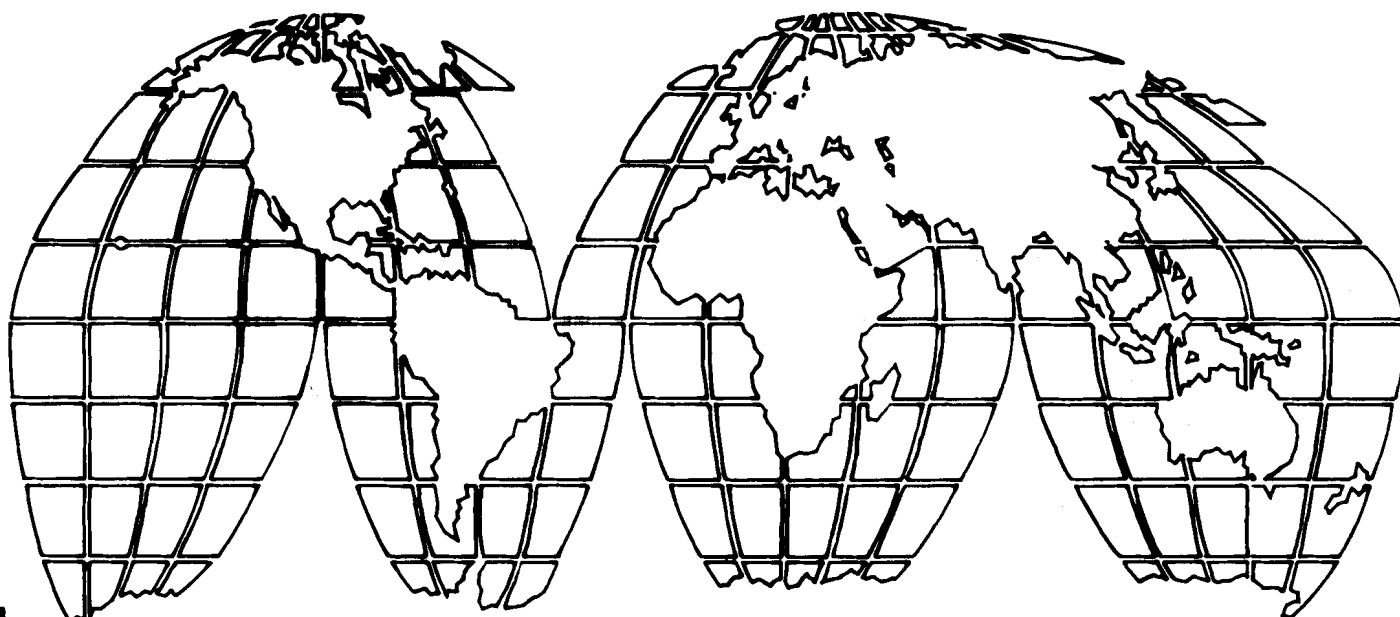


A.I.D. Project Impact Evaluation Report No.11

Jamaica Feeder Roads: An Evaluation

BEST AVAILABLE



November 1980

Agency for International Development

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(continued inside back cover)

JAMAICA FEEDER ROADS: AN EVALUATION

PROJECT IMPACT EVALUATION NO. 11

by

Robert J. Berg, Evaluation Officer
A.I.D. Bureau for Program and Policy Coordination

Carleen Gardner, Consulting Sociologist
Kingston, Jamaica

Michael M. Horowitz, Development Anthropologist
State University of New York, Binghamton

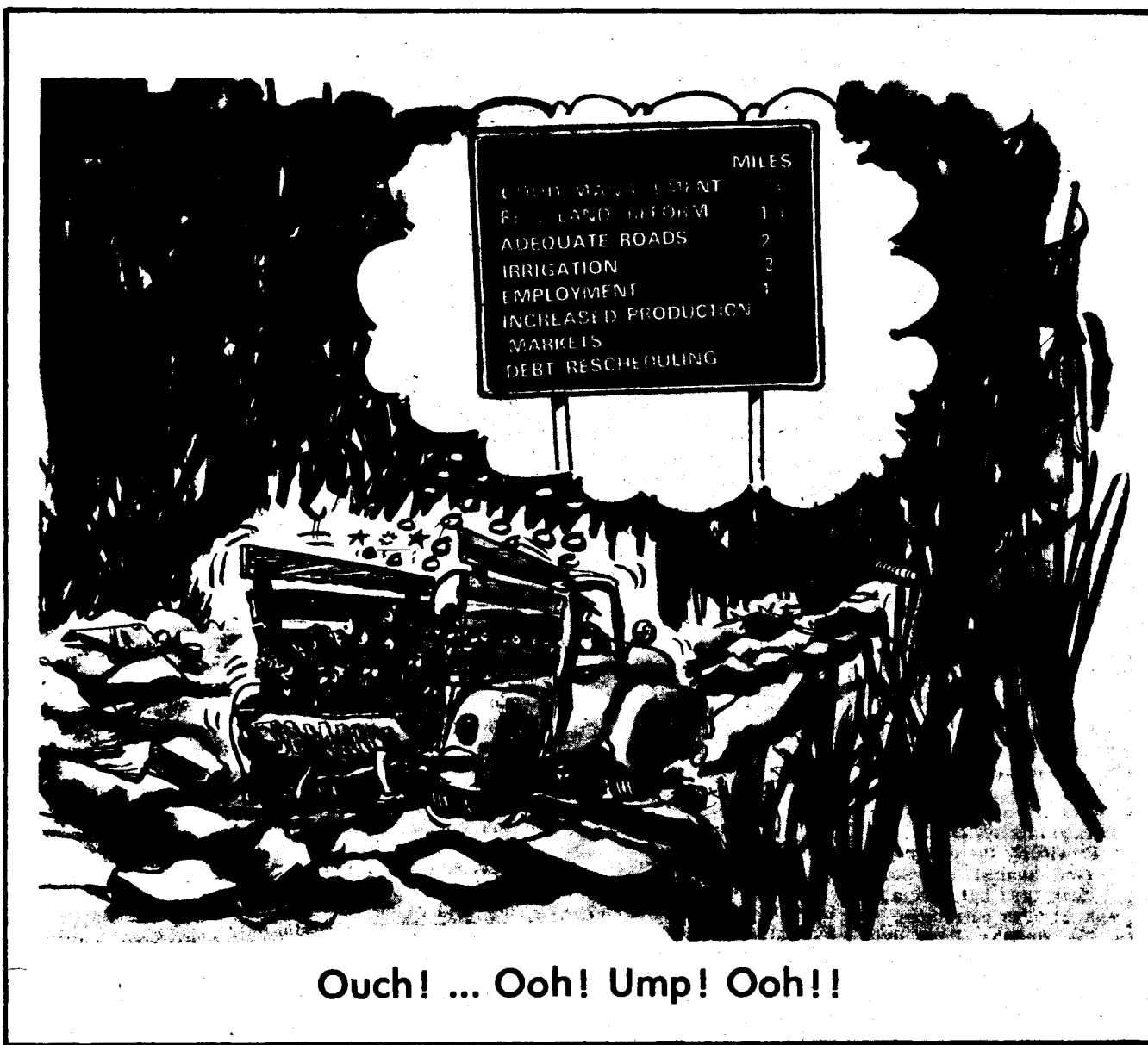
Palmer Stearns, Civil Engineer
A.I.D. Bureau for Development Support

Charles Vandervoort, Transport Economist
U.S. Department of Transportation

Agency for International Development

November, 1980

The views and interpretations expressed in this report are those of the authors and should not be attributed to the Agency for International Development.



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EXECUTIVE SUMMARY

The Jamaica Feeder Roads project was evaluated as part of an inter-regional study to learn more about A.I.D.'s experience in low volume rural roads. An inter-disciplinary team studied the project in March, 1980. This report and the others in the rural roads series will be summarized in a final report of the inter-regional study.

The Jamaica project was designed and analyzed with unusual rapidity responding to what were considered urgent political needs in 1970. A political strategy was articulated then and a development strategy evolved.

The project which emerged led to construction of improvements during 1972-76 to a large number of short road segments totaling 181 miles (3 percent of Jamaica's rural roads) scattered throughout the island in a very wide range of geographic and social settings.

Two major design changes during implementation doomed both the political and development strategies: the change to asphalt (capital intensive) from gravel (labor intensive) roads, and the adoption of a new method to carry out the sub-project feasibility studies which stressed improved and new cultivation rather than assessing the potential traffic and savings in operating vehicles on the improved roads.

The result was relatively little new employment which torpedoed the political strategy of creating rural employment to slow migration to the cities in order to reduce crime which in turn was forecast to increase tourism and create a better political climate. In tracing through this strategy the report demonstrates that even if high rural employment took place the other parts of the strategy could not have been expected to materialize.

The development strategy also failed. The economy has been in a tailspin, but even if it had grown, the roads were not economically justified. Traffic levels are extremely low; improved cultivation practice was and is dependent upon the availability of inputs and a better marketing system, not better roads; and new cultivation was a myth since the feasibility studies mistook land in fallow as land which the farmers would push into cultivation once the roads were improved. The economic impacts from the roads are very marginal.

Several social impacts were assessed. The roads were associated in some areas with spreading rural electrification and potable water. Some new housing schemes and a fair amount of private housing construction took place along the improved roads. Women benefitted as shoppers due to easier access to markets, but although women are the preponderant crop traders, female marketers did not benefit greatly from the roads since more of the traders with trucks are males.

Since the roads were improvements rather than new roads, the benefits did not disturb existing patterns for good or ill. The roads served people who already had economic and social access; they did not help people who did not have such access. People near the roads had been able to market their crops and now can do so as well or better. Those not near the roads did not receive much benefit from any of the social and economic services studied.

Institutional impacts were varied. Maintenance is a major problem. The Ministry of Works became stronger, but the private sector suffered from association with the project. The net impact was to strengthen the government to carry out major road works, not more feeder roads. The government and A.I.D. performed well technically but did not adequately supervise the development (economic and social) aspects of the project.

The team concluded that due attention to the strategies adopted at the outset and as changed during the project might have prevented the misuse of the project. This would have taken considerable courage given the political impetus for the project. The team also believes that the Agency must be more assured of adequate program supervision during implementation including far better articulated project and country program evaluation plans which actually get carried out. Good evaluation is precisely what Jamaica needs to determine what to keep and what to discard in order to live within its means.

The choice of the Ministry of Works as implementing agent was administratively efficient, but brought the project under the authority of an entity more comfortable with high technology solutions. A.I.D. must be more careful to assure that implementing agencies and program goals are matched.

A.I.D. planners should treat rural roads in the context of rural production; an agronomist should participate in the design and key program decisions of such projects.

Finally, the team is concerned that the lessons of this project be understood by the country team to avoid a repetition of this experience--something we believe is quite possible at present.

FOREWORD

As part of a worldwide effort to learn the development contributions of rural roads, A.I.D. is conducting a number of impact evaluations. The Feeder Road project in Jamaica was selected for study given its emphasis on creating rural employment and on remedying major social and agricultural production problems. A multidisciplinary team was assembled which met for two days in Washington and then spent three weeks in March, 1980, doing field work in Jamaica.

The evaluation team is grateful to numerous people who assisted in this report. Preparation work was efficiently and expertly handled by colleagues in the Office of Evaluation's Studies Division. In Jamaica the USAID Mission gave the team full administrative support on whatever we requested. The team greatly benefitted from generously allotted time by numerous officials in Kingston and the field associated with: the Ministry of Construction, the Ministry of Agriculture, the Ministry of Finance and Planning, the Ministry of National Security and the Jamaica Tourist Board. We recognize the difficulties all these officials face now and we are particularly grateful that they took time for us.

I wish to thank each of my teammates for their assiduously applying their intelligence and energy on this task. The fact that we found ourselves in complete agreement on the conclusions, plus the cooperation and plain hard work amply given by my colleagues, made my task easy. Had we not found what we did, this work could have been termed a pleasure.

Robert J. Berg
Associate Assistant Administrator
for Evaluation

PROJECT DATA

Title: Rural Feeder Road Improvement (A.I.D. Loan 532-L-006)
(A.I.D. Project No. 532-0035)

Scope: Improvement of feeder roads in Jamaica, and provision of equipment, management and technical advice to Ministry of Works.

Key dates:

Visit Jamaica Prime Minister-President Nixon	August, 1970
U.S. Presidential Commission Study on Jamaica	December, 1970
Intensive Review Request (PID equivalent)	March 22, 1971
Project Paper	June 2, 1971
Loan Agreement Signed	August 16, 1971
* Revised Methodology Submitted	May 16, 1972
Construction	1972-76
Final Report	June, 1977
Cost: U.S. loan	\$10,000,000
Government of Jamaica contribution	\$ 8,800,000
TOTAL	\$18,800,000

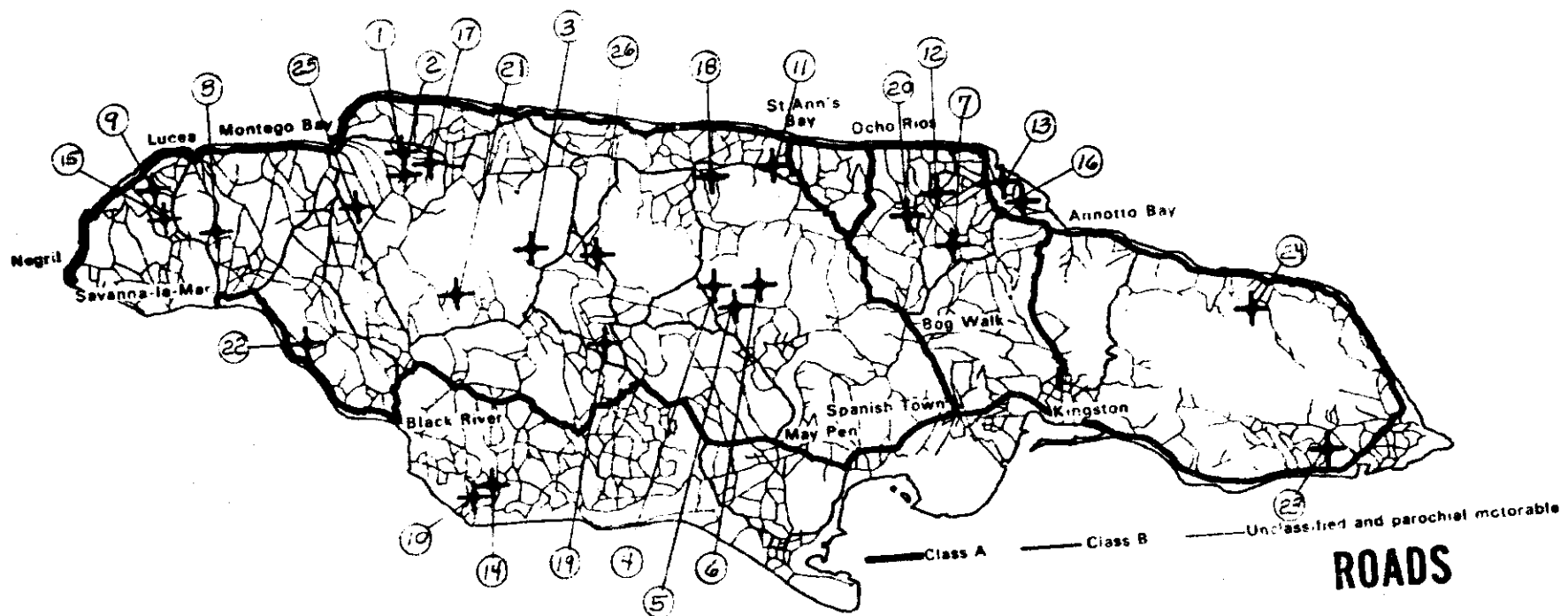
Physical Accomplishments:

Roads: Original Estimate	325 miles
Revised Estimate	200 miles
Actual	181 miles of improved roads

Equipment: Actual procurement 73 items

Technical Assistance: training, management information services.

LOCATION OF IMPROVEMENTS



Sites Studied in Depth

St. Elizabeth (Roads 10 and 14)
 St. Mary's (roads 20, 12 and 7)
 Central IRD (Roads 4, 5 and 6)

"Will the Last Person to Leave Jamaica Please Turn Off the Lights"¹

I. BACKGROUND

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Jamaicans live outside of what the world considers an island e in the production and export of the main crops has gone on a half. Economic problems abound which are the primary reasons so many people have left. Political problems, including violence linked to followers of the major parties, have added a note of particular concern to the current situation.

All students of Jamaica, even short-term ones, have theories about why Jamaica has been on a downward spiral. But no one seriously argues about the direction of change. In this kind of dramatic, sometimes dangerous and often wrenching situation, the test for a development project isn't whether it leads to glorious new heights of development. Realism dictates that developers be satisfied with merely slowing the decline, or at best achieving a steady state economy. The obvious challenge for the team was to see if a partial intervention, improved rural roads spread in little pieces around the island, had noticeable impact. But the challenge was even greater as we uncovered the history of the project.

A. History and Strategy

In August 1970, high Government of Jamaica officials met with then-President Nixon regarding the possibility of additional development assistance and other help to assure the retention of the party in power in Jamaica. 1972 was an election year in Jamaica. A U.S. Presidential Commission (State, Commerce, AID) was quickly set up to perform a three-week survey of development and investment opportunities. In their November-December 1970 study, the Commission heard from the Prime Minister and Minister of Finance that their top priority was to create numerous jobs quickly in the rural sector. Roads, forestry, river control, water supplies and housing "which could be undertaken quickly without extensive engineering" were suggested for A.I.D. finance.

¹Bumper sticker, Kingston.

Within six months of the Commission's report, A.I.D. authorized \$10 million to support a \$17 million program of construction of rural road improvements throughout Jamaica. The unusual rapidity of this action for what was recognized as a fairly complicated project attests to the political importance of the project as seen by the two governments. While the announcement of a major loan must have been of political use to the party in power, it is noteworthy that the project did not create a single job prior to the 1972 Jamaican election. The election resulted in a repudiation of the Shearer government and a new development course for Jamaica.

In reviewing the origins of the project, two distinct strategies or rationales for assistance emerged: a short-term and a long-term strategy. The short-term strategy was distinctly political and hence would be routinely disregarded in most evaluations. But the team chose not to do this. We regarded it as valid to test the hypothesis that the project would create rural employment which would retard rural-urban migration, which would then reduce urban crime, which would then help increase tourism and create a better political climate. (This strategy is outlined on page 1 of Appendix A.) We shall term this the Political Strategy. A.I.D. formulated a more traditional, longer-term Development Strategy which held that the improved roads would increase agricultural production and social services in the selected areas, which would increase income and well-being of small farmers, in turn leading to rural stability (i.e., less migration to the cities or even a reverse migration back to the farms) and this would help produce more urban peace. (This strategy is outlined on page 2 of Appendix A.) While the team looked for other impacts, positive and negative, arising from the project, we traced the validity of both these strategies.

An early and important decision was selecting the implementing agency: the Ministry of Works (now called the Ministry of Construction). It was an understandable choice since it is a national agency. But its transport experience is mainly in primary and secondary roads. It has little experience in and sympathy for low technology roads. The Parish Councils are the local government authorities which still manage most of the 7,000 miles of rural roads in Jamaica. Implementation through these entities would have been far more complex and could not have taken place in the compressed time frame originally desired.

For all the urgency, it took a full year after the August, 1971, signing of the loan for the conditions precedent to disbursement to be met. Implementation was slow as the Ministry of Works geared up to the task. Competitive contracting, which was estimated to cover one-half the work, fell behind for a number of reasons and the government wound up doing 81 percent of the work under force account.² The greatest amount of construction activity was in 1974-1975 by which time the impact of sharply rising fuel costs was being felt throughout the island (e.g., higher fertilizer costs and higher asphalt costs for projects like the Feeder Roads). Heavy rains hit in 1974-75. By 1975 it was clear that about half the originally estimated

²I.e., utilizing government equipment, management, and labor.

mileage could be constructed with available funds. A.I.D. funds ran out in early 1976, but the Government of Jamaica continued project work until 181.3 miles of road improvements were completed, 56 percent of the original target. In all, only six months were lost on the original schedule, but fewer roads at higher cost were completed.

B. Selection of Roads

At the time the project was analyzed for financing it was assumed that the justification for project roads would be savings in transport costs and the value added to products (particularly bananas and sugar cane) delivered to market at higher value than would have otherwise been the case. This is an appropriate test for road improvements. A critical change in the project occurred just prior to its start when the Government of Jamaica proposed and A.I.D. agreed to a different test of feasibility: the value of increased production on existing cultivations plus the value of forecast production from acreage brought into production. This is an appropriate test for new and penetration roads, but less than 4 percent of the project entailed such roads. This decision and a decision at about the same time to build asphalted roads instead of less costly and more labor-intensive marl/crushed limestone roads were critical technical decisions with major ramifications for the success of the project.

Twenty-six roads consisting of 68 named segments were selected for improvement. Each segment is short, averaging less than three miles. All are two-lane asphalt. (See map on p. v.) Only Kingston Parish did not receive a road; all other parishes did. The areas containing the project roads differ widely with regard to supporting infrastructure, land tenure, services, and density of farm population. Some areas have rich cultivation, rural electricity, potable water and good homes with more than an occasional T.V. aerial in sight. Other areas have old and tired-looking cultivation, with only infrequent dwellings and those in a state of borderline poverty. Most of the roads had initially been constructed as part of land settlement schemes in the 1940s and early 1950s. (A more detailed discussion of the selection system used and a description of the Land Settlement Schemes are found in Appendix B.) The roads selected for improvement represent less than three percent of Jamaica's rural roads.

II. VERIFICATION OF EXISTENCE

A. Roads - U.S. Contribution \$7.55 Million

The team traveled over 1,700 miles in search of the 181 miles of project roads. Although often accompanied by Jamaican officials, we had difficulty finding all the roads: the very plethora of rural roads in Jamaica, almost all unmarked, makes identification of little bits and pieces difficult, particularly since feasibility study maps proved less than fully accurate and final maps were not available. The team viewed 31 of the road segments, 25 of which (nearly half of the project mileage) were inspected

by the team engineer. The engineer's description of the project and his analysis of the roads surveyed are found in Appendix H. Of the roads examined 12 percent of the mileage was judged to be in excellent condition, 43 percent in good condition needing just minor maintenance, 23 percent in fair condition requiring substantial repair, and 22 percent in poor condition requiring major reconstruction or resurfacing. Interestingly, the roads constructed under contract generally were in far better shape than force account roads, attesting to higher standards being imposed on the private sector than the government imposed on itself.

While the poor quality of some of the roads is understandable given severe rains and floods over the past few years, there has also been inadequate maintenance. (See Section IV.D. below).

B. Equipment - U.S. Contribution \$1.7 Million

Seventy-three pieces of equipment were supplied to the Ministry of Works to bolster its construction capability: 49 pieces are currently in operation, 16 are under repair and 8 are out of service. These are reasonable down and survival rates. This equipment now comprises 35 percent of the Ministry's total equipment and 55 percent of its mechanical construction capability. Most is now being used to construct major highway improvements being financed by the World Bank, IDB, and CIDA. This is somewhat ironic since the Bank and IDB are trying to steer the Ministry toward using its equipment for maintenance. Giving this problem the best reading possible: the Ministry is not able to use the equipment unless donors pay, and donor priorities are for larger roads--the alternative may well be to let the equipment lie idle. Attachment 2 of Appendix G discusses the Ministry of Works' equipment capability since the Feeder Road Program.

C. Institutional Improvements - U. S. Contribution \$.75 Million

As the project progressed, A.I.D. agreed to amendments in the original design to assist the institutional development of the Ministry of Works. Provision was made for training, preparation of organizational and procedural manuals, and the development and implementation of a computerized construction management information system. These programs are discussed in Appendix G. Training was provided at the professional level for all phases of feeder road construction. Those trained served well on the feeder roads project and were afterwards immediately transferred to projects of high priority, often to positions of greater responsibility. In addition, 20 equipment operators were trained, 19 of whom are now with the Ministry.

Some copies of some of the operational manuals (produced prior to 1976) have been distributed; the other reports will only be distributed after people are sufficiently trained to use them--the full logic of which is difficult to understand. A construction management information system was produced, but has never been used. (See Appendix G, Attachment 1 for details.)

III. FINDINGS ON SHORT-TERM "POLITICAL" STRATEGY (EMPLOYMENT - MIGRATION - CRIME - TOURISM)

The Political Strategy used to select the project was almost immediately lost sight of after the project was authorized in June, 1971.³ It wasn't pursued and had no discernable impact.

A. Employment

Not much local employment was created. The project paper estimated that 1,750 unskilled jobs per year would be created over the three-year life of the project. In fact, employment was made up of three classes of labor: supervisors; skilled workers (masons, equipment operators, and others); and unskilled laborers. The first two categories of labor usually did not come from the nearby areas of construction; unskilled labor did. About 20-40 unskilled jobs per road improvement were created during the construction period. For about half the project these jobs were part-time (two weeks on, two weeks off) to allow farmers to work their fields. Later, because some workers became more practiced and reliable, full-time unskilled labor became the rule. But at no time during the project were more than 500 local people employed, as the chart below indicates.

Estimated Unskilled Labor Component (man years)

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>Total</u>
Planned	-	1750	1750	1750	-	5250
Actual*	16	173	298	500	274	1262

*Based upon Ministry of Works reports that the peak year was 1975 when 500 unskilled laborers were employed. Other years calculated on basis of work completed.

Unskilled employment usually lasted only about four to six months. The team concluded that the effect on employment was minor. Only 11.6 percent of project funds went to unskilled labor (versus 43.5 percent implicitly planned) and such an allocation can hardly be termed a labor-intensive project. Extensive interviews and a review of all project documentation leads to the conclusion that at no time during implementation was labor intensive road construction seriously considered. An estimate of the labor component made by the consultant in 1973 (after one year's activity) showed how little actual unskilled labor was being created. Had this evidence been considered important, the remaining 90% of project construction work might have been affected. This said, the team believes that the generally equipment-intensive

³Indeed, the political strategy wasn't paid much attention by A.I.D. even in the design phase. But it was the motivating strategy in identifying the project to start with and was key to the Embassy's thinking at the time.

methods used were probably appropriate for asphalt roads. (For a further discussion of this see Appendix H.4.)

B. Short-Term Migration Effect

Even if large-scale employment in rural areas had been created, it is not likely that this would have helped stabilize or even reverse migration. The wages paid for the heavy labor involved in the unskilled work were exactly those then calculated for the Kingston area (about \$1,400/year). Such employment in Kingston, however, would likely be more steady and less arduous. But employment in foreign countries, then a considerably more likely target of migration for unskilled labor, was at much higher pay than either the road project or Kingston. It should also be noted that the attraction of Jamaican, U.S., Canadian and U.K. city life was based not only on very competitive employment opportunities, but on the excitement of city life, a factor against which rural society could not compete.⁴

C. Effect on Urban Crime

The next link in the strategy chain--that migration flows can be related to urban crime--is also weak. The Permanent Secretary of National Security advised the team that new migrants are not the cause of urban crime. He and other experts on crime in Jamaica hold that the first generation of urban migrants are generally peaceable and employed. In fact, their rate of employment is higher than the urban born. The second generation are more troublesome.

The PermSec feels that the only major migration trend in the three areas of highest crime in Kingston (of 30 areas followed) is movement among the three areas, not between rural Jamaica and them. In any case, crime has increased in Jamaica before, during, and after the Feeder Roads Project. High officials active in the past and present governments allege that neither the past nor present government believes that rural employment schemes are related to urban crime. They say that this strategy has never been a factor in Jamaican planning. But the team believes that this is the kind of strategy which would be seen as a reason for exceptionally fast processing of A.I.D. assistance: it read to the American political audience.

D. Effect on Tourism

The last link in the chain is also weak, i.e., the proposal that urban crime rates influence tourism. Jamaica Tourist Board surveys of tourists report that tourism is dependent upon how tourists view Jamaica (in recent years this view has been adversely affected by Jamaican nationalizations), air

⁴See Rex Nettleford, Caribbean Cultural Identity: The Case of Jamaica, Center for Afro-American Studies & UCLA Latin American Center Publications, Los Angeles, 1979.

fares from the U.S. and Canada (the main source of tourists), and the economic climate in the U.S. and Canada. In fact, tourism declined and then went up after the roads were put in.⁵ Recession in the U.S. and Canada is generally credited with the sharp drop in tourism in the 1976-77 period.

Significantly, the main areas of tourism (Montego Bay, Ocho Rios, and Negril) are relatively low-crime areas. The area with the highest level of crime, Kingston, accounts for 10 percent of tourism now, a slight decline over previous years, but likely due to better direct air service to the main tourist areas. Overall, tourism has both gone down and up at the same time crime has continued to go up.

E. Conclusion on Short-Term "Political" Strategy

It may well be key to the analysis of this and future programs to focus more sharply on alternatives to meet agreed objectives. The problem in this project is that many unrelated objectives were thrown together. If tourism was the prime concern, A.I.D. at that time was able to assist that sector. If urban crime was the main concern, or if urban unemployment was the main concern, there would have been far more efficient and direct means of affecting these admitted problems. If migration was the main problem, an analysis of why people migrate would have been useful. Such a survey would probably not have found that lack of short-term unskilled rural employment was the constraint. Overpopulation, lack of land, and the general decline in the economy would have ranked higher, as they still do. If fast rural employment had been the problem of prime interest, fast options existed (e.g., river channelling which even now is heavily labor-intensive work involving men and women). But to string roads-employment-migration-crime-tourism into one hypothesis does little credit to the art of creating plausible development or political strategies.

IV. FINDINGS ON LONG-TERM "DEVELOPMENT" STRATEGY

We turn now to the development side of the project. Here the team was concerned with the major economic, social, environmental, and institutional impacts of the project. Three areas of the country were chosen for study: the south St. Elizabeth area, a drier coastal area concentrating on vegetable production for the domestic market; the St. Mary's area in the northeast, a higher and wetter area concentrating on production of bananas and sugar cane for the export market; and the central area which also contains the integrated rural development program, a major initiative. These areas are marked on the map on page v.

⁵In terms of the most accurate measure of tourism, bed nights sold, tourism has been as follows: 1974--2,179,748; 1975--2,142,739; 1976--1,718,520; 1977--1,562,487; and 1978--2,253,488.

In reviewing the development results of the project, the team bore in mind both the original and revised development strategies. In the project paper the economic analysis was based on the assumption that the roads would lower transport costs, increase the quality of goods marketed and increase services to the project areas. But the details of the feasibility method to be used to select sub-projects were left for a formal government submission. As noted above, that submission proposed a different system (strategy) which was agreed to by A.I.D. The agreed strategy assumed roads would lead to more intensive cultivation of existing farmed acreage, plus the bringing into production of significant new acreage. The combination of very significant projected increases in farmer income, plus an increase in social services to feeder road areas would result in a stabilization of migration or a reversal of historic migration patterns. The team was able to compare results against both these strategies. Insufficient time existed to compile more than informed judgements in weighing the total results, but the team believes that with either of the strategies used, the roads were not justified and this should have been clear at the time.

A. Economic Impacts

To gauge economic change in the midst of a severely declining economy is difficult. To do this for a series of short roads scattered among a variety of micro-economies is not simpler. But the decline must be remembered for it means that farmers are short on fertilizer, their other inputs are unreliable (including such basic tools as machetes), extension agents are partially grounded since their fuel allowance is grossly inadequate; piped water supplies (as may exist) are not repaired; marketing organizations are not funded adequately to buy; truckers are going out of business as spare parts, replacement vehicles, and fuel are scarce or getting to be prohibitively high; weather has varied from drought to flood; and people are tired of trying when the returns are poor.

The evaluation team tried to account for this by estimating what the economic worth of selected sub-projects would have been had the economy grown at a respectable rate, e.g., 7 percent/year, notwithstanding the fact that at the time A.I.D. authorized the project the agricultural economy had been in a six-year decline which, in fact, has continued. A rate of traffic growth of 7-10 percent/year in the roads studied would not have affected the team's basic conclusion that the majority of the project roads are not economically justified. A combination of low traffic and high road construction costs led inevitably to this conclusion.

In reviewing the economic impacts of the project the team commissioned surveys of the traffic of three roads and these verified our impressions of low traffic--far too low to justify the standard of construction chosen. The contrast between high quality roads and little use was captured by a woman who lived along-side one of the roads and who, in complimenting the improvement, said: "Many folks from Cave Valley and Cornershop come to this nice and quiet road to learn how to drive. My children like to watch them." In the

projects' feasibility studies truck traffic, particularly, had been grossly over-estimated by annualizing the traffic estimated at the peak harvest period.

The team also did not find the major increases in production forecast in the road feasibility studies. A sample of these studies is shown in Appendix C. This is typical in that it forecasts at least a doubling of production in five years. These increases were to be the result of better production techniques stimulated by the road improvements and the bringing into cultivation of new, more easily accessible lands. These predictions display a less than full understanding of production practices. The team found that farmers were operating intelligently given their resources. The improved roads had little if anything to do with the methods chosen for production. Furthermore, the supposed availability of large amounts of uncultivated land is a myth. Apparently those conducting the feasibility studies assumed that land in fallow was available for production. No farmer we met with would risk the loss of land productivity by stopping the time-honored and sensible practice of keeping part of the land in fallow.

The assumption that existing and forecast new production could be easily marketed was beginning to be questionable at the time the project was authorized, was certainly in doubt when the sub-projects were being analyzed in 1973-75, and still is a major problem. Farmers complain of crops not being evacuated, crops being graded well below standards, payments coming late from the state and private marketers, and their general inability to market large quantities. Had production increased to the forecast levels there would have been severe marketing problems. As it is, the team witnessed crops rotting in many fields and interviewed farmers who were stopping trying to maximize production. And some were leaving the country.

In summary, the major constraints on production on small holdings are the result of the disadvantageous economic position of the small holder, rather than a lack of incentive because of difficult access to the market. Our conclusion is not new to the Government. The Ministry of Works provided to the team a report on the project submitted November, 1974, by rural sociologist, Cedric McCullough, which said that the availability of complementary inputs, land reform and marketing facilities was key to the success of the project.⁶ It stated flatly that the economic and social benefits from the improved roads would not be achieved without such other improvements, particularly complementary inputs.

In short, the economic impacts do not justify the investment. The team's full economic analysis is found in Appendix D.

⁶"Rural Feeder Roads Programme: A Programme to Ensure Increased Agricultural Production and Social Development", November, 1974.

B. Social Impacts

1. Benefit Incidence

The prime intended beneficiary in the project Development Strategy was the "average" farmer in a given area. By and large, the average farmer was described as having about 5-6 acres of cultivated acreage and about double that in total holdings. On the ground, the team had difficulty identifying this average farmer. In a few of the projects the small farmer seemed totally absent. One sub-project in the west of the island seemed only to serve a large private pimento plantation. Another ran through a large state-owned farm. But the difficulty of using averages was best illustrated by the Accompong-Thornton road (which includes one-third the new mileage added by the project). At the Accompong end are numerous farms so small the farmers measure their land in squares,⁷ not acres, while at the Thornton end the new mileage of the road runs through the huge Appleton sugar plantation (and accompanying sugar refinery/rum distillery). The feasibility study fails to mention that the project is made up of these two extremes: instead, it described an average farm of 5.6 acres.

Use of an "average" family with average acreage masks the tremendous range of variation on which the averages are based, and in so doing presents a picture of an economically homogeneous rural population, with more or less the same opportunity situation. In our own field work we interviewed farmers who control 50 acres, 13, 8.5, down to those with less than 0.5, and those who, owning no land of their own, either lease or share crop small plots (up to 2 acres) or hire themselves out to work on land owned or leased by others. While skewed distribution is not unique to Jamaica, its occurrence is striking and, indeed, is one of the best known of its problems. (National and area statistics are presented in Appendix E.1.)

Projecting benefits of an intervention which might accrue to a statistically average farmer given the above distribution and concentration of large holdings among a relative handful of owners is clearly misleading. An effective social analysis must disaggregate from the statistically typical the significant groups of landless, miniscule farmers, small farmers, large farmers, and latifundists, and attempt to assess impacts accordingly. Furthermore, the kinds of quality of lands held by these several groups are likely also to be highly variable, with the poorest small farmers owning or renting the least attractive lands.

An analysis which distinguishes groups in terms of access to holdings of different size and of different productive potential is likely also to reveal different strategies relating to subsistence vs. commercial production; uses of varying entries to the market; a different allocation of labor with specific implications for the position of women, the elderly, and children; and so forth.

⁷One-tenth of an acre.

It may be useful nonetheless to point out that the original road network on the island followed topographic considerations: roads were not built where the slopes were considered too great. The first roads concentrated on the lowland and lower valley areas of plantation production (sugar cane and later cane and bananas). It was the relative impenetrability of the higher lands for estate production that made them available to small farmers who devoted a portion of their lands to domestic crops (yams, cassava, etc.), and it is in these highlands that persons escaping from slavery sought refuge. It is probable that a significant proportion of those lands which remain most poorly serviced by roads are also those which contain some of the lowest income members of the rural population. Since the vast majority of the feeder roads upgraded existing roads rather than opened up previously isolated areas, those highland poor may remain relatively untouched by the program.

Because the roads were merely reinforcing an existing pattern within areas of coverage, the benefit incidence appears to be that which already prevailed, an observation made to the Jamaican government as early as 1974 by Cedric McCullough.⁸ We believe this conclusion is also reflected in the other main social aspects of the project discussed below.

2. Impact on Women

The impact of the project on women was not great. Few women were employed in the construction of the roads (some as water carriers and cooks). But women are heavily engaged in agriculture, account for 77 percent of the self-employed and commercially independent occupations and among the latter a large group are higglers⁹ (87 percent of total higglers). But among the higglers, the ones with trucks are mainly male (although there are some very important exceptions). By and large, women benefited as consumers since shopping has been easier with the improved roads, but as traders they may have been at a slight disadvantage as motorized buyers had slightly easier access to crops.

Women were not a specific source of concern in the planning of the project. It was aimed in part at crime-oriented migrants (we assume this meant males) and at rural road construction (also predominantly male). So by implication it was a male-dominated project. Had women been a source of more concern during the planning phase, other types of rural construction would have been more seriously considered, e.g., river channel construction, where the team observed a significant amount of female labor.

3. Impact on Availability of Social Services

In Appendix E we analyze the impacts of the roads on the availability of educational services, health services, housing, consumer goods, rural electrification and potable water, as well as the impacts on the perceived quality

⁸Op.cit.

⁹Traders who deal at the retail and wholesale levels.

of life and impacts on migration. In brief we did not note a significant increase of social services in the project areas, but we did find that roads led to more infrastructure. This was particularly striking in the case of rural electrification where new power lines were installed along many of the improved roads.

The team noted a paradox in regard to perceived quality of life. "We are glad for the road" was a phrase we often heard. People were not materially better off from a road, but the symbolic value of an improved road is great.

A key goal of the project was to reduce or even reverse migration. We found this did not happen. The main cause of migration is overpopulation. One of our best informants compared the more stable days "before we exploded" (!) to more recent times when there "has been just too many people" for the land. Stemming migration through improving a road was a circuitous way, at best, to deal with the problem of rural overpopulation.

C. Environmental Impacts

The team's environmental analysis is found in Appendix F. We found some trapped water channeled onto private property which had caused destruction of crops (the team will long remember the image of an elderly farmer hugging a breadfruit tree killed by water trapped by poor drainage of a road improvement), some erosion, and we had some concern about the short-term losses during the construction period due to the settlement of dust on plant life near the construction areas. While some problems exist, they are local, can be remedied and are not a pervasive part of the project. Unfortunately, poor people harmed by the project are not able to pursue their claims effectively in part due to the complexity of the bureaucracy and the distances involved, and in part since monies are not available to compensate for this kind of damage.

D. Institutional Impacts

The major institutional results should have been maintenance of the project, fostering of private contractors, improvement of the Ministry of Works, and use of the private and public sectors to carry out further feeder road projects.

Of all these considerations maintenance of the project is the most immediate concern. The project agreement called for submittal of a detailed maintenance plan. A.I.D. permitted an I.B.R.D. plan to be used for this. That the plan was not sufficient is academic since the plan was not carried out. The project is a sharply deteriorating asset in many instances. Budgetary provision for maintenance is completely inadequate. While this may be understandable given higher maintenance priorities, there is no evidence to indicate that the Mission either called for a sufficient maintenance plan to start with or that it followed the issue sufficiently in recent years.

The project's impact on the private construction industry was slightly positive in the short-run (since some business was generated) but distinctly negative in the longer run since contractors were held to fixed prices at a time of steep inflation. Many went broke.

The institutional impact on the Ministry of Works was positive. The project provided good experience to middle and senior Ministry staff; expanded the work force of the Ministry; furnished it with a significant amount of equipment; and provided useful training, but an unused computerized management information system. The net result was to strengthen the Government's capability to work on roads. But subsequent to the project the Ministry of Works' efforts went to inter-urban roads rather than to feeder roads. Had A.I.D. and/or the Government of Jamaica desired a different long-term effect, the locus of the project should have been the Parish Councils which deal almost exclusively with rural roads. Appendix G reviews these issues in more detail.

E. Conclusion on Long-Term Development Strategy

In the above analysis we have portrayed a project which had a weak economic return, many indifferent social effects (i.e., did not affect existing patterns) and some social service improvements, affected some poor people adversely regarding environmental considerations, and left behind some institutional improvements which were used in areas not foreseen originally. On balance, the team believes that on the micro level the project did not harm people, but was not the best investment to help people. (On the macro level, of course, Jamaica will pay a high cost for a very poor investment.)

If the strategy was to improve long-term rural income by raising income and services, improvement of existing roads was not a key constraint or priority. Programs to increase irrigation, credit for inputs, and marketing improvements would probably have been more to the point. Roads would have been useful in some areas, but the project did not discriminate well between areas in need of new or improved access and other areas.

V. A.I.D. ROLE

The team believes that the routine technical supervision of the project was carried out conscientiously. There was a good deal of paperwork in implementing the project and it seems to have been handled fairly well. Engineering supervision from A.I.D.'s side seems to have been good: government officials remember frequent A.I.D. site visits and a generally quite helpful relationship.

However, this report is quite critical of the programming and program review role undertaken by A.I.D. While the project was almost completely political in origin, A.I.D. should have exercised far more care to thoroughly scrutinize the proposal. Careful review of the proposal would have led either to its rejection or to a substitution of a program which would better meet the needs of the time.

The political strategists and approval officials bear a large part of the responsibility. But project implementers, both in the Government of Jamaica and in A.I.D., also had, but did not exercise, major opportunities to question the significance of the project. Indeed, the project agreement called for an annual review and evaluation, but apparently these exercises were restricted to reviews of construction implementation. The team identified nine major opportunities from 1971 to 1979 (listed in Appendix I) when A.I.D. could have chosen to better analyze the project. All opportunities to evaluate the project during implementation were ignored. In fact this report is the project's first evaluation.

The team feels confident that a more development-oriented monitoring and evaluation effort by the Mission and the government could have resulted in a different outcome. At the very least, the push for rural employment could have been emphasized. Differences between and within areas should have been highlighted. Design standards should have been more appropriate for given areas. Locations of greatest need should have been more emphasized. And, the proposal to change the basis on which sub-projects were studied for feasibility should have been scrutinized and rejected.

At the current time of serious economic difficulty in Jamaica, a more pronounced effort by government and major donors like A.I.D. to evaluate development programs and strategies may be in order. While national planning officials we conferred with desire evaluation findings, they are simply too hard-pressed by daily crises to afford the effort. A.I.D., however, should be in a somewhat better position. It was thus disappointing to find senior Mission officials who could not identify the Mission Evaluation Officer (a title carried by the Mission Program Officer) and to find that since the Agency has removed the requirement for an annual evaluation of on-going projects, the Mission's evaluation activities have declined greatly without much substitution for a policy and program-oriented strategy of evaluation. The Mission can make serious contributions to better planning in Jamaica through such an effort if it not only makes good use of A.I.D. on-the-ground experience, but integrates the experience of other donors (as shown by evaluations and other donor reports).

In sum, A.I.D. engineers performed fairly well. But A.I.D.'s Directors, economists, program officers, loan officers and evaluation officers should have accomplished more, particularly during the implementation period.

VI. SUMMARY CONCLUSIONS

All governmental activities have their political aspects and certainly politics is no stranger to development nor to bilateral assistance. But this project was conceived as a politically-based "quickfix" and in basic development projects like this one "haste makes waste". Infrastructural and other basic development programs should not be the instrument for short-term aims, even when these aims are valid. In the present case there was an unfortunate

confluence of misguided political and economic aims. Misguided not that the aims of rural employment, lowering migration, lowering urban crime, increasing tourism, increasing production, or increasing rural social services are not valid goals. But misguided in that improved rural feeder roads have very little to do with these goals in Jamaica.

When there are desires which are seen as imperative, the desire to be thoughtful is often fought, but it would have been worthwhile questioning carefully the strategy and means employed in this project. A.I.D. has long employed the Logical Framework as a device to examine causal relationships. The Frameworks for the somewhat complicated project strategies are sketched out in Appendix A. Clear design analysis or even basic project evaluations would have illustrated that the causal linkages were weak at each step in this project.

The result was: very little employment impact since this was not consistently sought; no relationship to short-term migration, urban crime or tourism; and no short-term political gains. Developmentally the project yields a weak economic return which does not justify the project as a whole, but may justify a few of its many segments; no impact socially except to reinforce existing patterns (and indeed those in a position to benefit did so through improved utilities, better availability of some social services and a minimal transport cost savings); generally neutral but in some cases adverse environmental impacts of significance to some poor families; and mixed institutional impacts (with the Ministry of Works generally benefiting and private contractors not receiving much business and those that did suffering for it). The team concluded that even if the economy had grown in the last decade, the project would still have been marginal.

Generally, the project was well carried out, to the credit of the Ministry of Works and Communications, but it was a misguided aim to start with, i.e., a bad idea done well. At a time of declining economic and social well-being, the major efforts spent on this project represented an opportunity cost of considerable size.

It is worth noting for American readers the magnitude of the mistake. In terms of absolute amounts the project funding was small for Americans: the U.S. loan amounted to about \$0.05 per capita of which (in real terms) about \$0.02 is to be repaid. This net cost of \$0.03 per capita can be compared with the per capita cost to Jamaicans: the immediate outlay amounted to \$4.50 per capita and an additional \$5.00 (plus interest) per capita will need to be repaid to the U.S. To Jamaicans the cost per capita is 317 times the U.S. per capita cost. When the fact that the Jamaican standard of living is well less than a fifth the U.S. standard, the relative impact on Jamaicans was about 1600 times that borne by Americans. A similar project in the U.S. would run anywhere between \$9.5 billion to \$30 billion. If relative importance and magnitudes are given due consideration, a commensurate caring might also be forthcoming.

The major question faced by the team once the above conclusions had been reached was: can a mistake like this happen again in Jamaica? We noted that the project was conceived in a major assistance push in 1971. Such a period recurred in 1977 and may well reoccur in 1981. We discussed with Embassy and USAID officials what is different now. These officials maintain that contingency planning is now taking place and that with sectoral and country (CDSS) analysis the chances for a repeat of 1971 are slim. This may well be true, but the team is worried that the Country Team expects the next assistance package to be implemented quickly. Far quicker than the six-year average needed by A.I.D. as a minimum to implement New Directions activities. (In this respect the five-year implementation period for the feeder road project was relatively short.) We are not so sanguine. In addition, a well thought-out evaluation strategy is missing in the Mission. This leads to the possibility of future failures on a par with this one.

The team would have preferred a happy ending. But events in Jamaica are far too serious for this. And the magnitude of the failure of this project is too great to spot the project's silver lining. Hard work on all sides is required to give assurance that future efforts will be of more worth to that unhappy island.

VII. LESSONS LEARNED

1. Old bureaucrats say that the more the hurry, the more careful you must be. When the project was proposed a thorough analysis of the rationale for selecting the activity should have been undertaken. A.I.D. may need to take on this kind of analysis and not assume the rationality of political decisions made for us. It would not have taken long to spot the fallacies.
2. The shift to a new economic and technical rationale was the kind of basic change which warranted major analysis. Such project or program changes should require more formal Agency consideration.
3. The implementation of the project from A.I.D.'s standpoint may be a case of what happens when "more with less" is attempted. In this case inadequate supervision of the project, in all fields but engineering, took place. Reportedly, during implementation program and socio-economic talent was not available in the Mission nor was it supplied from the government or nearby Washington to provide needed program supervision and evaluation oversight. New Directions projects require this kind of overhead and operate at high risk without it.
4. Contrary to Agency requirements, the project was not evaluated during implementation. This must also be seen as a failure to have an accountable Agency evaluation system. A.I.D. must assure that its evaluation requirements are carried out. In this case, had evaluations been carried out consistent with Agency policy, the project's outcome might well have been more favorable.

5. The choice of the Ministry of Works as the implementing agent was fateful. The necessity of putting the project together quickly argued for selecting a national and competent implementing authority. But this also meant that an organization far more comfortable with higher technology construction was selected. National ministries have less sympathy for labor-based construction than local authorities.

6. Rural roads are a potentially important part of rural production systems. That this project did not have such a role might well have been spotted by an agronomist early in the design or implementation of the project. In any case, we must not treat rural road projects as infrastructure, but as an approach to rural development worthy of analysis through the eyes of those who know farmers.

7. Perceived good may not really be good. The project was seen by many as a real contribution to the rural economy. That it is not has been shocking to many. Hard data have a value beyond the reputation of projects.

APPENDICES

Subjects are grouped under the nine appendices, following. At the beginning of each major appendix an outline of topics covered is presented.

APPENDIX A

PROJECT STRATEGIES

PROJECT STRATEGIES

1. The Short-Term, Political Strategy

Goal: Good Election Climate
Tourism

Sub-Goal: Urban Peace

Purpose: Rural Employment

Output: Improved Rural Roads

Inputs: Force Account Teams
Contractor Forces
Technical Assistance to Ministry
of Works
Feasibility Studies

This strategy is best summarized in a section of A.I.D.'s Intensive Review Request (March 22, 1971) entitled "Political Significance":

"As viewed by the Embassy in Kingston, the importance of attacking the unemployment problem in the short run is related to reducing the potential for violence in the Kingston area during the upcoming election period. Youth under 25 account for an estimated one-half of the unemployment in the active labor force -- estimated at 13 percent overall in a recent IBRD study. The Embassy is fearful that unless employment opportunities open up in rural Jamaica, a sufficient number of discontented, unemployed youth from the rural areas will gravitate to Kingston to raise the critical mass in this already over-crowded and tense low-income area to the explosive level. It is further feared that once violence broke out, the conflict would become self-propagating and would continue indefinitely. Such an outcome would have serious if not disastrous economic consequences for Jamaica's tourism industry. Since 1965 tourism has replaced sugar as Jamaica's second largest foreign exchange earner (after bauxite) and is projected to grow at a rate of 10 percent per year. An outbreak of sustained violence in Jamaica would in all likelihood result in a significant loss in foreign exchange earnings and domestic incomes derived from tourism, as well as reducing the planned level of investment in hotel construction."

2. Long-Term, Development Strategy: 5 years +

Goal: Urban Peace

Sub-Goal: Rural Stability to Stem Exodus
(Enhanced settlement schemes)

Sub-Sub-Goal: Rural Income of the Poor increased through
profitable sales of agricultural production
Well-being of the poor increased through more
availability of social services

Purpose: Increase Agricultural Production on existing
land; bring into production new lands at
high production level

Generation of Social Services linked to rural
and urban centers

Outputs: 200 miles of improved roads in Settlement Areas
(more roads later)

Inputs: Government force account teams, enhanced with
new equipment, management training, equipment
operators trained

Ministry of Works improvements in operations/
information

Private Contractor work

APPENDIX B

THE PROJECT SETTING

THE PROJECT SETTING

This appendix consists of three parts:	Page
1. Selection of Roads	1
2. The Land Settlement Schemes	3
3. The Agricultural Marketing System in Jamaica	4

1. Selection of Roads

Previous Page Blank Agreement clearly set forth the criteria for selection
to be improved:

"(a) in most cases, the nucleus of the region would be Land Settlement Schemes where over time farmers have settled in a rational system of farm sizes with a minimum of facilities;

(b) the region should be one with high developmental potential;

(c) the region should have identifiable market centers, at which outputs are sold and inputs purchased; and

(d) priority would be given to areas where the ratio of miles of rural roads to acres was less than considered optimum by the Government of Jamaica, a rough guide being 1 mile of vehicular road to 100 acres."*

Projects were to have an internal rate of return of at least 10% based on a study methodology originally intended to focus on: savings in transport and vehicle operating costs, more reliable access to markets, and higher prices for crops which arrived at market in better shape (e.g., sugar which had a higher sucrosity due to its arriving sooner at the sugar mill). This is an appropriate methodology for a project to upgrade roads. Based on an estimate of \$40,000/mile, it was estimated that 325 miles of feeder roads could be improved.

* A.I.D. Loan Agreement 532-L-006, Annex A, pages 3-4, August 16, 1971.

A special Task Force was established within the Ministry of Finance and Planning to perform the selection task. Three ministries participated in this: Works, Agriculture, and Local Government. Roads were nominated by local governmental bodies. Apparently 50 roads were considered, but only 28 were studied of which 26 passed the test of feasibility. Interestingly, A.I.D. and the Government had agreed upon a new basis for accepting feasibility; i.e., increased production of existing lands, and bringing into production new lands. This is a methodology generally considered appropriate for new roads. A sample of a typical feasibility study is attached as Appendix C.

The 26 roads selected for improvement are spread all over the island. Only Kingston Parish did not receive a road. Some of the roads are in areas of relative wealth, some in areas of considerable poverty; some in areas of established access; a few in areas of difficult access. Some areas appear to have potential, others are being worked with considerable efficiency. In sum, the criteria set forth in the Project Agreement did not seem to be accomplished; rather, each area of the country seems to have been given a share of the program. In part, this may be logical given a considerable amount of existing infrastructure. There just are not many areas of the island without roads. Even so, some areas are clearly worse off than others.

Jamaica is a small island: 150 miles long and only 50 miles at its widest point. Yet, the territory is tremendously complex. It is as if 20 tiny countries were pushed together like so much clay, only with a different texture and elevation for each part. Each mountain and valley seems to be different from its neighbor. The vertical distances are great: a team member commented only partly in jest that if Jamaica were flattened out it would be the size of Australia.

Jamaica's road network covers some 9,000 miles in an area of only 4,200 square miles. The Ministry of Works and Communications (now called the Ministry of Construction) has responsibility for all arterial and secondary roads. A key decision was to select this ministry as implementing agent. Most of the more than 6,000 miles of rural roads in the country falls under the responsibility of Parish Councils. Some roads, within agricultural settlements, are built and maintained by the Ministry of Agriculture. Eight miles of new road were included as part of the project. All other roads had been Parish Council roads of rough gravel tracks providing access during the dry season and often during most of the wet season to trucks and other vehicles with high ground clearance. Most of the roads had been initially constructed during the 1940's and many were land settlement roads constructed in the early 1950's.

2. The Land Settlement Schemes

For more than three hundred years, the island of Jamaica was dependent on sugar as its major crop and principal source of foreign earnings. As a result, most of the country's resources were concentrated on the development of the rich alluvial plains where the large sugar estates were located, and on the port towns which serviced these estates. Early this century bananas were introduced as a second export crop, grown also on large plantations but on the more productive lands in the upland region. The dominance of sugar and bananas resulted in two critical deficiencies on the island's development strategy. The first was underproduction of domestic food crops. This was the first to be recognized since the Great Depression affected the island's import capacity, and shortages and starvation threatened. Domestic food was grown exclusively by small farmers in the uplands, with little assistance from the formal agricultural institutions whose priorities were focused on the export crops produced by the dominant planter class.

A second neglected resource was the large acreages of land abandoned by the plantocracy after the demise of sugar and later at the twilight of the colonial period. Many large properties fell into ruin during this period.

Concomitant with the absolute urgency to produce more food, was the fact that the social profile of the country had begun to change, as the black rural population rapidly increased, due to improved health conditions and the return of migrants from Central America and Cuba. There was high unemployment. Since, at that time, political power was associated with land ownership, the unemployed and landless had no voice in the local legislature. It was not until the movement toward political autonomy and subsequent independence which began with the organization of plantation labor, that serious land reform was considered.

It is against this background that the land settlement scheme began in 1929. Its purpose was twofold: to increase domestic food production and to reduce the growing social and political pressures from the rural poor. Between 1929-50, 28,000 persons purchased lands, as the government acquired many large properties, subdivided them into lots of between 5 and 7 acres and sold them to peasants. The initial payment was one-tenth of the cost of the land, the remainder was to be paid in 10 years. After the riots of 1938, the terms of payment were improved to 20 years, and one-twentieth of the cost of the land. The land settlement scheme continued throughout the remaining years of the colonial period and for eight years after independence settling numerous small holders and laying the base for Jamaica's rural settlement pattern.

Despite the achievements of the land settlement program as far as its contributions to increased domestic food crops (and to providing security of tenure for those of the rural population who could afford to purchase land), the scheme had a number of inherent problems. The lands purchased for land settlement schemes were of medium or low capability and were located in areas which lacked basic infrastructure and access to market towns. Roads into settlements were often no more than upgraded bridle paths and winding level gravel roads which made it difficult for vehicles to negotiate. During the period of development of land settlements agricultural policy shifted its emphasis from export crops on large holdings to the small farmer, by providing extension services, loan subsidies and marketing. As production increased and the aspirations of the small holders extended, the farmers began to demand improvements to the infrastructure of the land settlements which had begun to develop into villages without regularity of form. That is, there was generally no village center, but dispersion of dwellings throughout the settlement, with a number of dwellings along the road leading to the main road, while the more distant fields and dwellings had poor access. Over the years, improvement to land settlement roads was a major activity of local parish council administrations, providing alternate sources of income to small farmers and landless laborers who found regular employment in what came to be known as "road work".

3. The Agricultural Marketing System in Jamaica

The internal marketing system in Jamaica is still largely traditional, with the main intermediaries being an estimated 20,000 "higglers" or food produce traders, primarily women who purchase on the farm and travel to Kingston or local periodic markets where they wholesale and/or retail. With increasing production of domestic food crops, the higgler system has become less capable of handling the larger quantities of produce. The Agricultural Marketing Corporation, established in 1963, set up 127 buying stations in close proximity to farmers, where it purchases larger quantities than higglers, wholesales at outlets and retails from green grocer shops. With the advent of roads, many higglers have become motorised and carry fairly large quantities of produce. This new wholesaler is generally a contract buyer for large institutions and hotels in the tourist and urban centers, retailing in the market only the rejected or surplus produce. Farmers, particularly small farmers, sell to both higglers and the Agricultural Marketing Corporation (AMC). It is easier for the small farmer to wait for the higgler to come, however there are disadvantages in the higglers' selection system which results in an overall lower price for the farmer. For the farmer with large quantities, the AMC truck will go directly into the field to purchase, however, the farmer

must first have secured a contract from the buying station for the amount to be purchased.

In areas where roads have been improved, more higgler drive to purchase goods; at the farm-gate, however, farmers still cannot sell all their produce, particularly since the AMC has declined in its ability to handle large quantities.

Traditional export crops are purchased by commodity associations specific to each crop. For sugar cane, farmers cut and pile cane at the roadside on the day on which they have been notified to cut through the local representative of the Cane Farmer's Association. For bananas, the radio announces on behalf of the Banana Growers Association when bananas will be purchased at the local boxing plant. Both crops are trucked to the buying location by independent truckers in a system which is less than competitive due to the high price of fuel and the lack of spare parts for vehicles. The cost of transporting produce to the buying station varies and often the trucker can demand extra payment as the farmer has no alternative method of marketing his crop. Other export crops, such as coffee, cocoa and pimento are marketed through commodity specific groups and have no remarkable marketing problems. We observed that a number of problems confront the marketing system, quite apart from the question of access. The farmer's unwillingness to undertake his own marketing independent of the established institutions private or public is interesting, since even if he has the opportunity to obtain a vehicle, he has no contacts with market outlets in the urban centers. The majority of farmers see themselves as growing for the government, since they have received loans and subsidies through government agents, consequently they see that it is the government's role to ensure that their crops are marketed. Finally, there are serious gluts of produce which prevent the market from absorbing particular crops at given times during the year. Storage for most crops is difficult as they are perishable and refrigerated facilities are not available.

Improved roads, independent of any intervention directly aimed at upgrading the capacity of the AMC probably resulted in increased higgler capability, however. The problems of large quantity purchasing and distribution which inhibit the AMC, remain.

APPENDIX C

TYPICAL FEASIBILITY STUDY

TYPICAL, FEASIBILITY STUDY

REPORT ON THE FEASIBILITY OF A PROPOSED ROAD IMPROVEMENT IN THE AREA OF SANTA CRUZ *

DESCRIPTION OF PROJECT

The project is located in the parish of St. Elizabeth on the southwestern coast of Jamaica. It is in the jurisdiction of the Santa Cruz Area Land Authority and lies between 17° 38' and 77° 40' Longitude. The proposed road improvement will upgrade 10.367 miles of existing road. The attached map shows the location of the various road improved and the area deemed tributary to the project.

The district towns closest to the project are Southfield, Ballards Valley and Epping Forrest, which are within 10 - 15 minutes driving time, or 1 - 2 hours walking time from the center of the project. These towns provide the basic infrastructure, such as post office, schools, health clinics, book center, market, community center and electric power.

COSTS OF THE PROPOSED ROAD IMPROVEMENT

It is estimated that the financial cost of the proposed improvements will be \$405,000 (Jamaican). It should be possible to complete the project within twelve months.

Annual maintenance costs are estimated at \$5,184 (Jamaican).

BENEFITS

Estimates were made of the benefits arising from increased production of the four major crops whose individual cultivated areas are expected to reach 150 acres or more within five years after project completion.

*This Appendix is taken verbatim from the Government of Jamaica's study of 1975.

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It is estimated that, with the improved roads, the acreage in crops will increase from 1,443 to 2,061.

The acreages in carrots, tomatoes, sweet potatoes and cucumbers should increase by 181, 119, 83 and 50 acres, respectively.

There should be no problem in marketing any of the increased farm output.

Attached Exhibit I shows the estimated acreages by crop, with and without the road improvement, and sets forth details of the benefits expected during the fifth year following the completion of the project.

Following are brief descriptions of the important individual crops:

Carrots The project area lies within the vegetable-producing region of the island. As stated in the report on the previous Santa Cruz sub-project, the soil type and climate of St. Elizabeth make it ideally suited to vegetable production. At the present time the parish produces some 50 percent of the local vegetable production.

Given the import substitute effort and the shortage of locally produced vegetables, it is estimated that additional acreage will be brought into production. Agricultural experts project something of the order of a 50 percent increase in acreage. This position is supported by the projections of the Physical Plan.

* The cultivated acreage is presently 42 percent of total acreage rising to 60 percent in 1993. These percentages are on the average lower than usual due to the fact that an unusually large proportion of land is used as pastures.

This is as a result of the low rainfall in the area, hence grass is used in large quantities for mulching.

Also, the area is in a large cattle production zone.

Tomatoes,	As in the case of carrots, a 50 percent increase
Sweet	in acreage is projected, and is based on similar
Potatoes,	justifications such as soil type, climate, demand,
and	etc. The Physical Plan supports this view and
<u>Cucumbers</u>	experts at the Ministry of Agriculture are projecting even greater expansions.

The principal sources of information used in estimating the potential crop increases are:

- (a) A National Physical Plan for Jamaica, 1970-1990, prepared by the Physical Planning Unit of the Town Planning Department, with the assistance of United Nations Special Fund Project;
- (b) unpublished reports in the Ministry of Agriculture, and discussions with agronomists and land use officers in the Ministry;
- (c) visit to the project area and discussion with the local farmers.

SOCIOLOGICAL IMPACT

The fact that the proposed road improvement is expected to reduce or reverse the migration from the area to major urban centers, is an important gain associated with the road improvement.

The estimated number of farms in the area is approximately 290, covering 3,435 acres resulting in an average farm size of approximately 12 acres. On the basis of the national average of five persons per farm family, the farm population is of the order of 1,450. About 1,443 acres are under cultivation which suggests that the average acreage worked by a farm family is about 5 acres. The average area worked by a farm family will probably increase to about 7.1 acres after the road improvements are made, assuming no change in the number of families.

A review of available data and discussions with agricultural experts, suggest that gross farm income averages about \$800 per year. Assuming that inputs amount to 25 percent of gross income, the net farm income could be about \$600 per year.

The estimated farm income gain resulting from the project, averages about \$765 per farm family per year, which would bring average annual income up to nearly \$1,365. Such a gain would afford

a significant inducement for farmers to remain in agriculture, especially since the annual earnings of an unskilled laborer are less than \$1,400 in Kingston, where living costs are much higher than on the farms.

ECONOMIC FEASIBILITY

A stable relationship between fifth-year benefits divided by construction costs on the one hand and benefit-cost ratio on the other was established by analysis of some 17 sub-projects, and is depicted in Exhibit II. For this project fifth-year benefits divided by construction costs gives a ratio of 0.55, which corresponds to a benefit-cost ratio of 2.9. The ratios are represented by the circled point in the Exhibit.

SANTA CRUZ
DERIVATION OF FIFTH YEAR BENEFITS

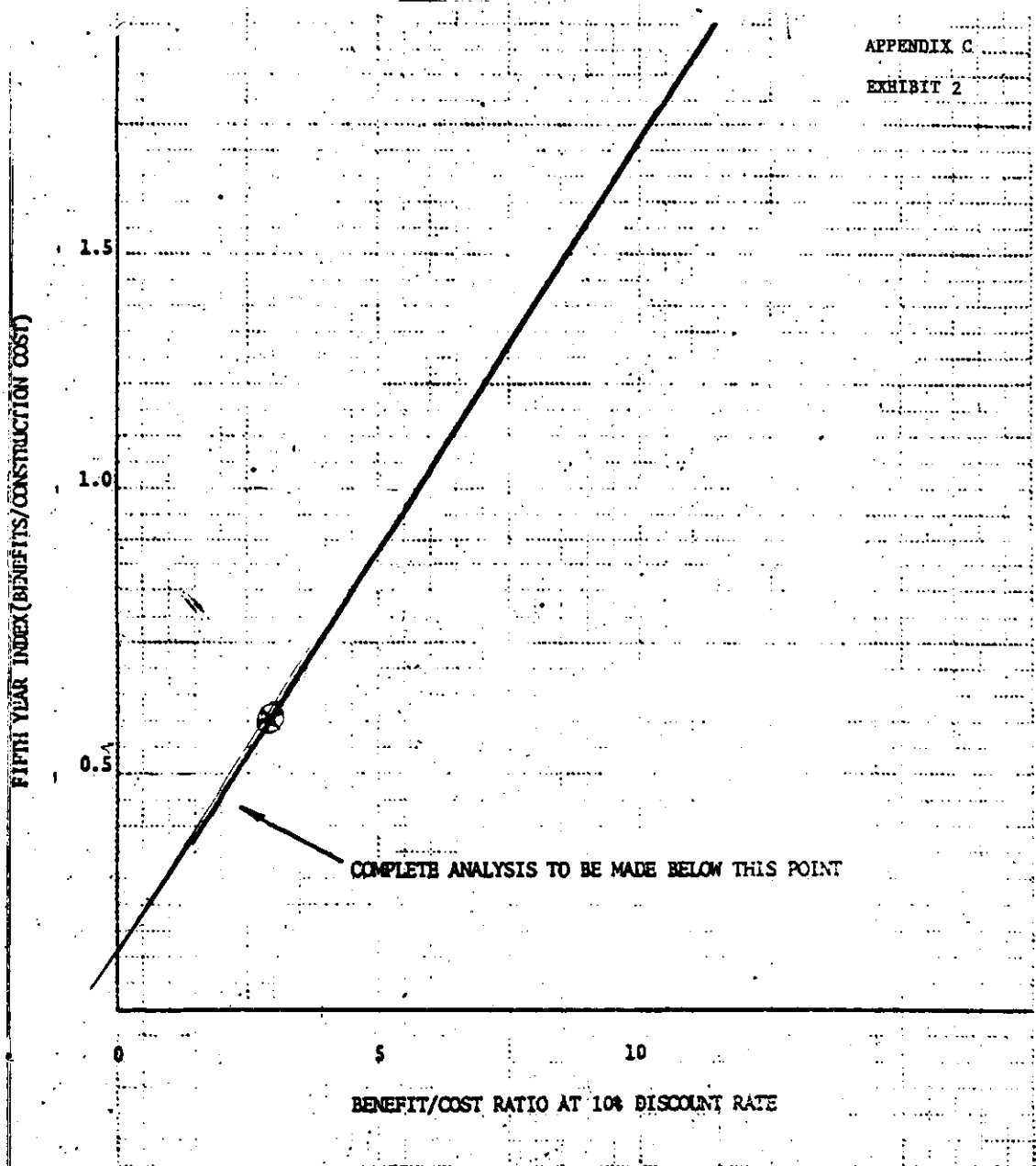
Group	Harvested Acres		Yield Per Acre Long Tons		Production (Long Tons)			Value Per Long Ton (J\$)	Percent Net of Gross	Shadow Price Factor	Fifth Year Benefits
	without	with	without	with	without	with	increases				
CARROTS	362	543	1.85	2.77	670	1,504	834	168	75	-	105,084
TOMATOES	237	356	1.67	2.50	396	890	494	147	75	-	54,464
SWEET POTATO	165	248	1.76	2.64	290	655	365	136	75	-	37,230
CUCUMBER	100	150	1.66	2.49	166	374	208	160	75	-	24,960
YAM	86	86	*	*	*	*	*	*			*
RED PEAS	72	144	*	*	*	*	*	*			*
CABBAGE	68	102	*	*	*	*	*	*			*
IRISH POTATO	54	83	*	*	*	*	*	*			*
CORN	25	75	*	*	*	*	*	*			*
OTHERS	273	273	*	*	*	*	*	*			*
TOTAL	1,443	2,061									221,738

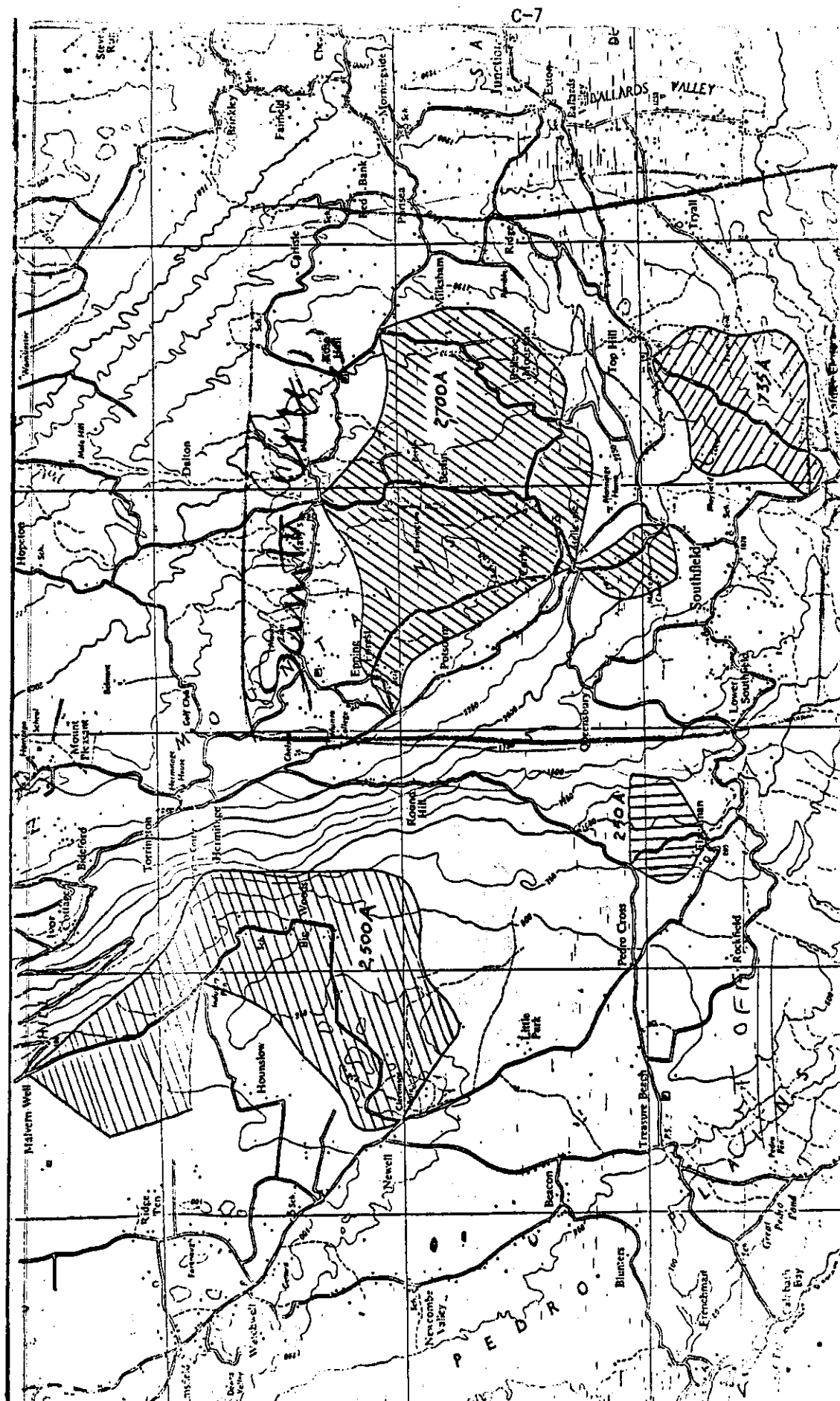
* Not estimated.

Note: For sources and methodology, please refer to prior studies.

APPENDIX C

EXHIBIT 2





APPENDIX D

ECONOMIC ANALYSIS

ECONOMIC ANALYSIS

This appendix consists of six parts:

	Page
1. Traffic Analysis	1
2. Production Analysis - Existing Cultivation	4
3. The Myth of Additional Cultivation	7
4. Marketing	8
5. Land Values	9
6. Entrepreneurial Impacts of the Feeder Roads	10

1. Traffic Analysis

In reviewing the traffic impact of the project the team commissioned traffic counts of three roads. At the time of the surveys there was significant marketing of the major crops in the area, itself a strong bias in favor of the roads. Only one of these was a feeder road, the other two were secondary roads in that they did not connect farms to a market. Rather, their main function was to connect sizeable towns and to serve as a link in the regional road network. The average daily traffic on the secondary roads (and these are the busiest roads) was about 25 vehicles per day on the secondary roads, and well below the 50-60 vehicles projected in the feasibility studies for these roads. The feeder road had an estimated 6-10 vehicles per day, and also well below the 40 vehicles projected in the feasibility study. (The consultant's final report notes that "good judgment indicated that there would never be a large volume of traffic to use these roads -- never beyond the capacity of minimum construction -- (of) up to 100 ADT.")* Of the traffic surveyed, 83 percent were passenger vehicles (although produce is hauled in such vehicles).

While some roads appear marginally worthwhile (if the economy had grown), many do not. They are high-cost improvements with low traffic

* TAMS Final Report, 6/77, p. 17.

use. To illustrate the incongruity of the excellent quality of the bituminous surface of the project roads and the almost total absence of traffic on some of the road segments, we quote the answer of a middle-aged lady living along a lesser-used road (which parallels a highway which does get great use). The lady was asked if many vehicles used the road. She remembered that:

"Many folks from Cave Valley and Cornershop come to this nice and quiet road to learn how to drive. My children like to watch them."

We hastily add that everyone interviewed said roads were a good thing, indeed a prized improvement held just ahead of irrigation and electricity, but those favored with improved roads could hardly be expected to react otherwise.

The roads are advantageous to the many rural residents, particularly rural farmers. The transport industry is competitive -- transport rates are set by competition within ceilings established by the Government -- and a typical road improvement project would reduce the transport rate by about 40 percent (though the absolute reduction in cost would probably not be large enough to stimulate additional farm production), or would at least reduce the increase in transport rates due to steep inflation. But even with the improvement of the roads, lack of adequate transport and the high price of transport still appears to be an important barrier to the full realization of the potential of the road improvement project.

The downturn in economic activity in Jamaica has caused many trucking companies to go out of business. (According to the World Bank, the trucking business has declined 40 percent since 1976.) The cost and scarcity of spare parts is leading to serious deterioration of the vehicle fleet, and the existing truck fleet in the rural areas does not appear to be able to satisfy the demand for transport even though rate ceilings have been moved up. This is manifested in one case where large quantities of spoiled grapefruit were observed at pickup points along one of the project roads. What happened was that the regular pickup truck had met with a serious accident (it had fallen down a ravine), and a replacement truck could not be found in time to prevent the spoilage. Also, the trucking service provided to sugarcane farmers is extremely poor. Numerous piles of spoiled sugarcane were observed especially along bad roads, but also along some project roads because truckers had all the business they could handle by concentrating on sugarcane located closest to the refinery. Even worse, those piles of cane that do get picked up have usually been lying along the road for 3-5 days, and have lost a very large portion of their sucrose content.

A major design error was in over-estimating truck traffic. There are several reasons for the large disagreement between the truck traffic as projected in the feasibility studies, and the truck traffic as actually observed. One reason, of course, is that the incremental agricultural production as projected by the feasibility studies is considerably larger than the incremental production that actually materialized. However, the most important reason for the high estimates of truck traffic was the erroneous procedure used in the feasibility studies in converting agricultural production tonnage to truck trips. The consultants in calculating the number of trucks per day required to transport the harvest for each major agricultural product did not realize that this truck traffic would materialize only during the harvest season of the particular crop. The harvest seasons for some crops such as yams and bananas are indeed all year, but for most

The above calculation is a gross savings to the economy. At no point did the project analysis calculate net savings. Had such calculation been made we might have had a better idea to what extent these marginal savings were offset by the displaced head-labor and mule-carry labor hired by farmers. It is quite possible that many of these displaced laborers were given powerful motivation to migrate to the cities once the roads were improved.

Had the proper methodology for justifying the project been followed (the methodology recommended in the Project Paper), it is possible that two of the six roads surveyed in depth would have shown sufficiently high traffic levels to be economically justified. However, our ex post analysis found that poor maintenance reduced the rates of return for these two roads, and when adjusted for bad maintenance, their rate of return also falls below the acceptable level.

2. Production Analysis - Existing Cultivation

As noted, the roads selected for improvement were rated through a relatively complex formula estimating production increases from existing and new lands. The feasibility study found as Appendix C is typical of the study methodology. The methodology chosen would seem appropriate for a penetration road program, not for analysis of improvements to roads constructed in the 1940's and early 1950's. In these areas agricultural production patterns and levels had been well established by the time the project started and the base level of production was relatively high. Nonetheless, production increases of at least 100 percent were typically projected for the project areas. How this came about is instructive.

The feasibility studies assumed an increased yield of exactly 50 percent for all existing cultivated crops in defined zones of influence. (These zones of influence appear quite wide given the relative density of roads in rural Jamaica.) These increases were based on higher use of extension services and on increased motivation to produce due to the ease of marketing once roads were improved. Our interviews with farmers indicated both that extension services offer little tangible services except access to government credit programs, but only very limited funds are presently available particularly for farmers who do not own land as they can not come up with collateral. Knowledge is not the constraint. Funds often are the constraint. Further, farmers are highly motivated to produce for the market whether they are on an improved road or not.

In the southwestern coastal area of St. Elizabeth we found sophisticated farming techniques. Expansion of these techniques was

prevented neither by lack of incentives nor lack of information, but lack of funds prevents the very small farms and the tenants from optimizing such improvements as irrigation, fertilization, mulching and crop rotation/intercropping and fallowing. These interventions are illustrated well in South St. Elizabeth agriculture and it is worth noting this important case to gain an appreciation of how far off the mark the feasibility studies were regarding the potential for greater production on existing cultivated lands.

a. Irrigation in South St. Elizabeth

Although Jamaica in general is favored with reasonable precipitation, there is great variation, and the southwestern coastal area is particularly subject to recurrent drought. To mitigate the effects of drought, many cultivators make use of some kind of irrigation system, from simple hand-watering of a small field from barrels filled at a standpipe to elaborate masonry catchments and reservoirs with gravity feed down the slope and electric or gasoline-powered pumps sending water into higher level fields. But these are enormously expensive, and the pumps are subject to a good deal of downtime especially now as foreign exchange constraints have made it difficult to obtain spare parts. Those farmers wealthy enough to maintain elaborate irrigation systems also benefit by anticipating the planting season for a specific crop and thereby entering the market when the price is most favorable. The vast majority of the small farmers are forced to rely on the weather, and therefore harvest at the time when the market is already saturated. The more affluent the farmer, the better able he or she is to schedule the agricultural cycle to his or her own benefit. The tenant farmer -- the cash leasee and the share-cropper -- without security of tenure in the land, cannot extort the expense of capital intensive irrigation.

b. Fertilizer Use in South St. Elizabeth

Throughout Jamaica chemical fertilizers are used. In the vegetable-producing zone of Southwest St. Elizabeth, farmers try to apply between 6 and 10 sacks of 100 lbs. per acre per crop (with up to two crops/year if the weather is favorable). There is some use of animal manuring by corralling livestock on fallow fields ("fly-penning"), but inorganic fertilizers are the major source of added soil nutrients. (We saw no systematic application of compost.) The price of these fertilizers has skyrocketed, and supplies are unreliable. In several areas farmers said that they are having an increasingly difficult time recouping the costs of fertilizer from the harvest. This was especially apparent in the banana production zone north of Christiana, where it was claimed that yields have declined markedly as a result of reduced

applications of fertilizer (at J\$ 14/sack). The preferred mixture for vegetables is currently selling at J\$ 32/sack. The small farmer, pressed for cash and unable to repay past loans, is at an especial disadvantage as the price escalates. Successful farmers, anticipating further increases in price and decreases in availability, have been stockpiling; one St. Elizabeth grower is currently storing 200 sacks which cost him J\$ 6,000!

c. Mulching in South St. Elizabeth

As a soil-moisture retaining device, vegetable farmers mulch their fields with guinea grass (*Panicum maximum*), and at any given time as much as 40 percent of cultivated lands may be devoted to the crop. Guinea grass is harvested and transported to the planted fields where a thick layer is placed above the onion, escallion, potato and other seedlings. A farmer with more than he or she needs may sell some to neighbors. The smaller farmers, who first must satisfy their domestic consumption needs and then market any surplus, have great difficulty in devoting an adequate portion of their fields to grass or, indeed, to fallow at all. In consequence, their yields are lower than on the farms of the more affluent.

d. Crop Rotation, Intercropping, and Fallowing in South St. Elizabeth

Peasant farmers in the vegetable areas tend to intercrop in order to have at least a trickle of harvest throughout the year. A single field may contain a mix of okra, carrots, and onions, or cucumber and sweet pepper. One small field contained a neat pattern of alternately spaced sweet cassava, carrot, tobacco, red peas, corn, cho-cho (*Sechium edule*), and sweet pepper, and was ringed with papaya and mango. This wide variety of crops provides the household with some food throughout most of the year, and reduces the risk of loss from drought or pesta (which find monocrop stands a more attractive arena for infestation). But this also limits the chance of making a "killing" in the market, a chance which is more likely to obtain to the large farmer who can afford the risk of loss from a less catholic display of cultigens.

On the other hand, the small farmer can ill afford to grow a low-value market crop in a full-crop rotation cycle as she/he cannot afford the luxury of long periods of fallow. Since she/he has little cash reserve to tide over the fallow periods the land is more subject to secular degradation than is that of the larger farmer who regularly rests a portion of his/her holdings or allows it to produce a leguminous crop like Gungo peas (*Cajanus cajan*).

3. The Myth of Additional Cultivation

The project feasibility studies assumed that with the improvement of the feeder roads farmers would cultivate up to 50 percent more acreage. These new lands would come from "pasture, fallow, and rinate". The feasibility studies seem to have misconstrued the use of these lands.

Certainly there are pasture holdings in Jamaica. But most of these are large holdings devoted to livestock: dairy and beef cattle and some sheep. While some of these holdings might be converted into cultivation (where economically possible), the studies did not calculate that such a shift would entail foregone income in livestock; rather, only gross gains were counted.

But in most of the project areas little traditional pasture land was observed. The typical farm has a few pigs and some goats. These animals graze on secondary growth lands of extreme slope, poor soil, and rocky surface. Goats are not only hardy but prolific, with frequent twinnings. They provide the small farmer with a readily salable item and with an occasional source of high quality protein. While the wealthy farmer may have large pastures which are potentially suitable for cultivation, the small farmer is trying to convert the most marginal land to some productive use through caprine husbandry.

The major source of potential new cultivation for the typical farmer in the project areas would be fallow land. No farmer interviewed would seriously consider this. Fallow land is seen as an economic necessity to preserve the productivity of the farm. To give up this important part of the farming cycle would, in their view, lead to a consequent reduction of yields and would require ever-increasing applications of costly fertilizers. More significantly, the feasibility studies fail to indicate that in many parts of the country fallow land retains its economic use through the raising of guinea grass. (See discussion on mulching, above.) If such land were to be shifted to cultivation there would be both a short-term loss from the income/value of guinea grass and a longer-term loss through the diminished productivity of the lands.

In sum, lands which sometimes look available for cultivation have been and are being rather fully used, particularly lands within a plausible zone of influence of existing roads (such as the project improved). The projection of new cultivation was an erroneous one.

While it might have seemed plausible to project an increase in productivity of existing cultivation, the idea of new lands should not

have been accepted. To test out the economic feasibility of the project if the linkage was only to increase productivity of existing cultivated land, a benefit-cost analysis was performed on the project summarized in Appendix C. Taking all other assumptions as stated in the analysis presented in Appendix C but omitting only the projection of increased land under cultivation, the project could not have been sustained. (B:C at 10 percent is .6:1 at projected construction costs and .3:1 at actual construction costs.)

4. Marketing*

The project feasibility studies stated that there would be no problem in absorbing the projected increased production. This may have been a reasonable assumption in 1971-72, but by the time later feasibility studies were performed (1974-75) reasonable questioning of this assumption could and should have taken place. The gradual winding down of the economy placed a continuing stress on the transportation and sales systems of the country. Farmers complain of crops not being evacuated; crops being graded well below standards; payments coming late from the Agricultural Marketing Corporation (AMC) (the government buying arm) and of higglers (private agricultural traders) not being able to absorb bulk purchases.

According to farmers in the area around Red Dirt (Flagoman)-Round Hill, for two successive years (1978-1979) the market has been unable to absorb the volume of onions produced. They were particularly distressed because the government exhorted them to produce onions -- and given the hypothesis that there is little land which can readily be brought into new production, an increase in any crop is at the expense of other crops -- and provided credits for seeds and fertilizer, credits which must be repaid, and yet the government marketing institution (AMC) purchased only a portion of the harvest. The local women higglers, whose small capital limits them to 50-100 lb. purchases, could not make up the difference, and tons of onions were left to spoil. One farmer reported that the failure of the AMC to purchase the onions he was encouraged to grow is a prime factor in his decision, at age 50, to pack up his wife and two sons and resettle in New Jersey. Other farmers said that the wise strategy is to listen to what the government wants to produce, and then plant

*A brief description of the marketing systems in Jamaica is found in Appendix B.

something else. (It appears that there will be reduced acreage in onions from that area this year, and an expansion of other cultigens, like peanuts.) Incidentally, those farmers appreciate that government institutions may have financial difficulties from time to time, and be hard pressed to purchase everything that is offered, but they believe that at the same time as they were unable to sell their onions at any price, U.S. onions were entering Jamaica via the Grand Caymans and being sold in urban markets.

The team felt that if the roads had resulted in a doubling and more of production in the project areas, there would have been major marketing problems. But we also recognized that the improved roads probably enhanced the ability of the private sector (higglers) to ply their trade. On balance, the team felt that the marketing factors have deteriorated in spite of the road improvements.

5. Land Values

Since 1972 the Jamaican government has promulgated a series of Land Lease programs replacing the Land Settlement program which began in the late 1920's. An essential difference between the two is that farmers were able to purchase lands under the latter program, while the more recent one provides for tenancies of varying duration. Since these are not directly germane to the issue of feeder road impacts -- although a number of the feeder roads are in close proximity to Land Lease areas -- we shall not discuss them here.

It is clear that the value of agricultural land has increased along with inflation, and it is likely that the value of those lands along the access roads has increased even more rapidly. In some areas, the improved vehicle access from upgraded roads is a factor in that increase. However, since roads have tended to follow the gentler grades, it is probable that part of that increase in value is a function of quality, for lands on the steeper slopes exploit soils of lesser natural fertility, and these are subject to continuous erosion. While it is difficult to document this on an area-by-area basis, it

*Lest this case be thought to be purely minor in nature, it can be noted that one respected student of Indian politics, Ved Mehta, credits the failure of the Indian onion crop as one of the three main factors which brought Indira Gandhi back to power!

appears that the larger holdings are in closer proximity to the roads, and they decline progressively in size as they push further and further up the mountainsides.

In any case, farmland does not often appear on the market. Few farmers felt that they could obtain additional productive lands at any price. In Southwest St. Elizabeth, the few land transactions reported in recent years tended to remain within a family.

In the Maroon area of Northwest St. Elizabeth it is possible that lands more distant from the road may also have escalated in value, because a cash crop specialty of the region -- *Cannabis sativa** -- tends to be cultivated under clandestine conditions. The same geographic isolation which facilitated the fierce independence of Maroon ancestors from the plantation slavery of other Africans now seems to protect the prized "sens-similia," reputedly the most potent form of ganja on the island. It is also possible that some reverse migration in that area, of young men with urban experience returning to the remote country village, may also have a good deal to do with the marketing of this high value to weight commodity.

6. Entrepreneurial Impacts of the Feeder Roads

It is very difficult to separate the influence of feeder roads from the general expansion of the road network in rural areas in terms of their effect on local-level entrepreneurship. Some farmers along the roads have purchased trucks, and they or their wives have become active in marketing as higglers. An individual with mechanical skills may be able to ply his or her trade closer to home. A rural shop or bar may be provisioned somewhat more regularly. One man in Southwest St. Elizabeth has built a small addition to his shop which he hopes will be named a sub-district post office. But these activities are not new in kind, for the small farmers have traditionally supplemented farming with other kinds of employment.

* Marijuana

APPENDIX E

SOCIAL ANALYSIS

SOCIAL ANALYSIS

This appendix consists of five parts:	Page
1. Land Holdings in Jamaica	1
2. Impact on the Availability of Social Services	3
3. Impact on Rural Electrification and Potable Water	5
4. Perceived Quality of Life	6
5. Migration	6

1. Land Holdings in Jamaica

Below are compared the island's total land-holdings and one area which the evaluation team gave particular focus, South St. Elizabeth.

FARM SIZE IN JAMAICA

<u>AREA</u>	<u>ISLAND - WIDE</u> *				<u>SOUTH ST. ELIZABETH (SANTA CRUZ)</u> **			
	<u>No. Farms</u>	<u>%</u>	<u>No. Acres</u>	<u>%</u>	<u>No. Farms</u>	<u>%</u>	<u>No. Acres</u>	<u>%</u>
Landless					43	.2		
Less than 1 acre					3,863	20.0	1,839	1.0
Under 5 acres	150,000	78.1		15.0				
1 - under 5 acres					9,941	52.0	22,163	13.0
5 - under 10 acres					2,930	15.0	19,214	11.3
10 - under 25 acres					1,674	9.0	23,661	13.9
5 - 25 acres	37,000	19.3		22.0				
25 - 50 acres	1,755	.9		3.0	329	2.0	10,673	6.3
50 - 100 acres	1,815	.95		5.0	103	.5	6,911	4.1
100 - 500 acres	800	.42		13.0	62	.3	12,465	7.3
Over 500 acres	<u>630</u>	<u>.33</u>		<u>42.0</u>	<u>26</u>	<u>.1</u>	<u>73,410</u>	<u>43.1</u>
	192,000	100.00		100.0	18,971	100.0	170,336	100.0

* World Bank Report No. P-2104-JM, "Proposed Loan, First Rural Development Project", June 8, 1977, p. 12

** Jamaica Agricultural Census, 1968-9.

2. Impact on the Availability of Social Services

According to the feasibility studies, the zone of influence of feeder roads fall within 10-15 minutes driving distance to town centers which provided a number of services, such as schools, post office, police stations, churches, etc. The implicit assumption was that access to services would increase their availability to the farmers and ultimately improve the quality of life of rural villages. This evaluation team tried to determine the extent to which these services had expanded to the areas immediately affected by the improved road.

a. Schools

Almost half of the population of Jamaica is 15 years or less. Everywhere there are hundreds of children. Those who go to school wear brightly colored uniforms which indicate what school the child attends. Many more children go to school today than five years ago, since the number of school places has increased by about 5 percent per annum.

Attending school in rural Jamaica means walking four miles a day for primary schoolers and much further for older secondary school children. In most villages there are no school buses and the minivans which ply the main routes are expensive. So, most children walk to school.

In two of the project sites we visited, the feeder road passed right by the primary school. One road serves a primary school, the other serves a complex which includes primary school, community center, basic school and secondary school. In these areas the school population increased by as much as fifty percent in one case after the road was improved. Both areas were fairly isolated from the major settlement prior to the road improvement. Although enrollment increased as the road improved, attendance is not more than 60 percent as children must remain at home two days each week (or more) to help with the farm. As farms become more productive, they tend to require more time from the children who are an integral part of farm labor. Overall we conclude that improved roads impact favorably on school populations for very isolated areas, however the real problem of attendance and access of the rural child to secondary education is not a benefit from this type of project

b. Health Services

The emphasis of Jamaica's health service is on primary health care with special attention to maternal and child health care. A

community health aide -- a para-professional who visits homes to administer pre- and post-natal care, and encourages use of the clinic -- lives in every neighborhood. Since there is one health aide to every 1,760 persons, and eleven health centers, on the average, to each parish, primary health care is readily available. But health care has improved over the last 5 years, independently of the roads. Despite improvements in the availability of health care, we identified five families with malnourished children within the zone of influence of a feeder road, in one of the highest producing vegetable areas of the island. Malnutrition in Jamaica is correlated with low income. High costs of food, the emphasis on export agriculture and agricultural inputs which are costly and of uncertain supply must also have a role in fostering malnutrition. Malnutrition is thus more prevalent in urban centers and sugar areas where little food is grown.

We found that improved health care had little relationship to improved feeder roads, however health workers and several residents felt that emergency services would improve if roads were motorable, since ambulance services could be brought closer to the injured or seriously ill.

c. Housing

New housing construction was observed in almost every well populated project site, despite shortages of building materials and the decline of the construction industry. High in Maroon country, at the end of a cul-de-sac, a proud young woman showed us her home which she was slowly building. She intended to move into the dwelling before its completion, as many people do, in order to save the rental she was now paying for a dilapidated wooden structure. Housing schemes for farmers and sugar workers are also found along some of the feeder roads; most are financed by the National Housing Bank, to which every worker contributes together with a 3 percent contribution from his employer. These schemes were built after the roads were improved, since construction of a scheme along a good road results in lower housing costs to the low-income buyer and development agencies tend to select sites where good roads already exist. Where there is not security of tenure or where income is too low to afford new housing however, as in the case of sugar workers who own no land, housing conditions are not likely to improve as a result of improvements to the road.

d. Availability of Consumer Goods

The source of goods for rural Jamaicans is not the local shop, which only stocks beer and soft drinks. In a declining economy where supplies of staple foods are scarce and where fuel costs \$2.22 per gallon, deliveries are made only as far as the major service center,

which is ten to fifteen miles from the rural village. The presence of an improved road has little impact on the availability of rice, flour, milk, tinned fish, which are foods most farm families have to purchase. As a result, village shops are empty and many are permanently closed. Higglers who come to buy farm produce are sometimes the only source of goods, but their supplies are also limited and are reserved for special customers. We interviewed one woman who reported that the improved road prevented the flooding of her shop, however, the shop closed three years ago when it became difficult for her to obtain goods. This project has made no difference in the supply of goods and services, since the economic climate has resulted in the scarcity of goods flowing into the rural areas. Over the last five years there has been a decline in business activities in all the project sites surveyed. Had the general decline not taken place, it may be safely assumed that there would have been easier access for goods and services in the project areas.

3. Impact on Rural Electrification and Potable Water

In calculating quality of life factors of importance, rural residents often say they want roads, electricity and water. In looking at the uses for which rural electrification is put in areas of the feeder roads and in looking at the types of water systems sometimes found in conjunction with the rural roads, we conclude that non-economic importance and use is given to these improvements.

Rural electrification is being vigorously spread throughout the countryside and electricity poles follow consistently many of the feeder roads. One representative from the light and power company stated that in determining which areas should be serviced, motorable roads are an important factor. In this instance, improved roads have brought the additional benefit of electric power to communities serviced by several of the project roads. An examination of the acceptors of electric power shows, however, that the poorest do not benefit, nor do the low-income families who live at some distance from the road. Loans for electrification are granted to those persons who (a) can afford to pay, and (b) who live close to the road.

It is perhaps too early to evaluate what the impacts of rural electrification are, however one important indicator of the direction of benefits is the fact that media communication has been available to rural villages. TV sets, sound systems and radios are important to rural villages in Jamaica and serve to integrate the rural population with the mainstream activities in Kingston.

What does seem clear is that little if any farm production is linked to the use of electricity in the feeder road areas.

Similarly, there is some evidence of potable water following improved roads in some areas. The systems are neither large enough nor planned for irrigation, but for household use. Either these systems are available through standpipes or, if housing is nearby and the occupant can afford the connection fee, the water is available directly in the home.

4. Perceived Quality of Life

"We are glad for the road" is a refrain we heard whenever we interviewed rural residents in the project areas. Roads are seen as a good thing. So, too, is rural electrification (if it can be afforded) and, certainly water is seen as a positive good. While the evaluation, in the short time possible, could not compile a quality of life index, the general perception of needs of rural infrastructure has been shown to be roads, water and electricity in that order. Roads did respond to a perceived need. People do feel better because of the road. Even the poor, who benefit little from the roads, feel it is good to have the improved roads.

5. Migration

The ultimate test set up in the project, and a seemingly fair test at that, is whether migration trends were slowed or reversed due to the project improvements. This phenomena was to be due, not to employment on the roads (it may be recalled that in the project Political Strategy employment on the road was linked to a short-term dampening of migration), but due to economic and social improvements which would enhance satisfaction with rural life and thereby lead to a stabilization of the rural population. As the feasibility studies stated: "The fact that the proposed road improvement is expected to reduce or reverse the migration from the area to major urban centers is an important gain"

Migration would be stemmed due to the higher income earned on the farm and to an increase of services to the area. We have already noted that the increased income could not have materialized but even if it had (according to plan) the income differential of city over countryside still would have prevailed (contrary to the feasibility study prediction).

According to the feasibility reports, the following improvement in rural income is a likely consequence of the road:

A review of available data and discussions with agricultural experts, suggest that gross farm income averages about \$800 per year. Assuming that inputs

amount to 25 percent of gross income (an assumption which we feel is unduly optimistic), the net farm income could be about \$600 per year. The estimated farm income gain resulting from the project, averages about \$765 per farm family per year, which would bring average annual income up to nearly \$1,365. Such a gain would afford a significant inducement for the farmers to remain in agriculture, especially since the annual earnings of an unskilled labourer are less than \$1,400 in Kingston, where living costs are much higher than on the farms (Santa Cruz III-IV, p. 3).

The impressive rise in net farm income predicted in the feasibility study, even if achievable, is hardly in itself sufficient to stem the flight of the young from the rural areas, for the comparison made is between the income of a farm family and that of an individual urban laborer. Given the assumption of a five-member family, per capita income at the optimistic level anticipated is \$273. Since even those funds are not equitably distributed among the members of the farm family, the incentive to migrate and earn \$1,400 as an individual would remain persuasive.

Quite apart from the issue of improved rural income, there are other incentives for a young person to leave the farm, and his or her ability to do so may well be reinforced by higher farm earnings, and with the family's enhanced ability to provide a grubstake for an emigrating son or daughter. (While much has been written about the impact of remittances from migrants to their home communities, there has been far less consideration of the investment which that community makes in its emigrating members, something reported frequently in our interviews.)

The incentive to migrate from the farm is reinforced by the conflict between a young person's desire for full adult status and a father's desire to maintain the integrity of the farm. As noted above, more than 70 percent of the agricultural holdings are less than five acres in size, areas which do not readily divide into economically viable units. Yet the acquisition of de facto seniority implies managerial control over an estate. A young man maturing is faced with a dilemma: either he remains on his father's farm in a status of jural minority, delaying the establishment of a family of his own, or he seeks employment -- and independence -- elsewhere. Thus, as the feeder road program's ability to generate new land for agriculture is very limited, the increasing revenue to the farm family should not in itself constitute a disincentive to emigrate. On the contrary, it may allow a farmer to cover his child's initial expenses while searching for urban

employment. Even pregnancy need not force a woman to return permanently to the farm or remain in her urban home, since the rural parents usually are prepared to receive and care for their grandchildren until they too are old enough to leave the farm.

As a consequence of this process, the demographic structure of the on-farm family is likely to include a middle-aged or elderly conjugal couple (or the widowed survivor of that couple) and their young children or children's children. Late adolescent and early adult offspring have left the household, and such additional farm labor as is required is provided by cooperative work groups among farmers holding comparable pieces of land ("day for day") and by laborers hired at prevailing wages (J\$8-10/day, plus lunch and "sooner," a mid-morning snack). While there are, of course, occasional instances of reverse migration, and the death or incapacitation of a farmer may induce a child to return and take over the management of the farm, it is difficult to attribute instances to the feeder roads per se.

As rural income rises, families not unnaturally desire the same advantages as are available to the urban population. They want electricity and clean drinking water. They want access to health services. But most of all they want a good education for their children, as a means of escape from poverty by entering the arena of trades, professions, and government. These opportunities are less well established in the rural areas:

. . . the better off the parents of a child the more likely they are to pay for his secondary education . . . Thus the discrepancies are increased. The largest and most predictable differences are those between the highly-educated parents and the rest; but the differences between urban and rural areas are also very marked. The difference exists even between parish capitals and rural districts "A hypothetical 'average child' in Mandeville . . . has a twenty times greater chance of going to a secondary school than his counterpart by the south coast." Most rural districts in the parish sent under 3 percent of the appropriate age group to secondary schools. (A. Kuper, Changing Jamaica, 1976:73).

Thus, it was common for the team to find older farmers (men in their 50's and 60's or widows of that age) being helped by one or two children out of the 6-12 children they reported. These families had children in Kingston, New York, Canada and London. In no case did a parent expect a child to return, but in a very few cases we did find children who came back. The flow is still strongly outward with no reversal in sight.

APPENDIX F

ENVIRONMENTAL ANALYSIS

ENVIRONMENTAL ANALYSIS

During interviews and discussions with relevant persons and during field inspections of the feeder roads, an effort was made to detect if any detrimental environmental consequences resulted from the project. Most of those interviewed had only positive consequences to offer. However, during the road inspection, several concerns became apparent. These are:

- Trapped water channeled onto private property.
- Settlement of dust on plant life during construction.
- Erosion.

Common to road construction are drainage ditches which channel water into culverts which provide intense flows at outlets. Unless provisions for this water are made beyond the construction limits of the road, it can cause severe scouring and erosion. Several situations were observed where damage had been caused to property owners abutting the road because such provisions had not been made. One property owner had constructed a large ditch from the culvert outlet through his property to protect his house and land from flooding. Another had changed the course of the water by constructing a small dam. Others, no doubt, chose or will choose not to build new homes or plant crops in the close vicinity of culvert outlets. Although these problems are localized, they presented problems to small farmers which resulted in either foregoing use of the land area affected or expending considerable labor in relieving the problem.

The short, abruptly-ending feeder road at Jointwood in a poor Maroon area is viewed by the local farmers as a mixed blessing. While they appreciate the ease with which small vans now reach the settlement and carry bananas, they complain bitterly of road-induced damages (for which they remain, they claim, uncompensated, despite repeated representations to the government). The losses claimed are of two kinds:

- (1) those induced by widening the pre-existing track, including loss of housing space and the sacrifice of a number of banana trees;
- (2) those induced by changes in drainage, which include water entrapment on the north side of the road (which

is particularly damaging to breadfruit trees) and erosion on the south side.

While one might dismiss these effects as minor, of the "no omelets without cracked eggs" variety and the unreasonable whinings of greedy peasants provoked by an articulate village lawyer, they are perceived locally as substantial in a community in which land holdings are measured not in acres nor even in half-acres, but in tenths of an acre.

An added problem for people in such areas is that compensation for such damages is paid by the government only when land title is proven. Poor people are far more likely not to have land title than the rich. In retrospect, it would have been worthwhile for the Ministry of Works to have advised the affected property owners of these problems and assisted them in correcting the drainage. Also, more consideration should have been given to positioning cross drains which are not in the natural channels or stream flows.

During construction of the road, the problem of dust both from the subgrade and marl base was apparent. Dust settling on plant leaves will to some extent deter the photosynthetic activity of the plant which is the process by which the plant absorbs its necessary carbon dioxide and water from the air. Discussions with personnel at the Agronomy Division and the Plant Protection Division of the Ministry of Agriculture indicated that no studies have been performed in Jamaica which might show the extent of damage from such dust. However, these personnel believed any such damage would be negligible since the dust would be prevalent for several short periods of time, i.e., during excavation and embankment construction and during application of the marl base course. Settled dust on leaves would be removed shortly by wind and rainfall. Thus, it is not believed that dust was a major problem to plant life during construction of the road.

Regarding dust, an employee in the Ministry of Agriculture commented that he had observed stunted sugarcane adjacent to marl surfaced roads, especially in plantation areas where tractors and trucks are constantly using the road, thus creating dust over a sustained period of time. Therefore, it might be concluded that the decision to make all the A.I.D.-funded feeder roads bituminous surface contained a payoff from the environmental standpoint. However, this payoff was not a factor in making the decision to asphalt the roads.

Some erosion existed during construction. However, this is considered negligible since the amount of land area involved in open cut and fill was small.

Erosion on side slopes is currently taking place in those areas where vegetation has not grown. However, this is localized and the areas are few since most of the open cut is shale. Of course, the erosion problem if allowed to occur will be costly from the maintenance standpoint. Already many retaining walls have had to be built.

APPENDIX G

INSTITUTIONAL ANALYSIS

INSTITUTIONAL ANALYSIS

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This appendix consists of four parts and two attachments.

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4. Impact on the Government of Jamaica	4

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1. Maintenance of the Feeder Roads

One of the Conditions Precedent to disbursement in the Loan Agreement was that the borrower furnish to A.I.D. "a final plan for maintenance of all roads to be constructed or improved under the project." Accepted by A.I.D. as satisfying this Condition Precedent was correspondence between the Government and UNDP for financial support for a maintenance program for the entire road system under the Ministry of Works, including a scope of work for a maintenance study. Also, the intent of UNDP was confirmed by A.I.D.

The International Bank for Reconstruction and Development (IBRD), acting as the executing agency for the UNDP, commissioned a consultant to carry out the study. The study was completed at the end of 1972 but did not include the feeder roads since they had not been constructed at the time. No evidence of any follow-through activity by A.I.D. can be found that might have assured that the IBRD study fully cover the A.I.D.-funded roads.

Another maintenance study was completed in 1978 by the same IBRD consultant. Arising out of this study of the 3,000 mile Ministry of Works system, a U.S. \$80 million maintenance program was identified. This program includes routine maintenance for the feeder roads but does not include bituminous resurfacing. IBRD is currently funding U.S. \$16 million of the \$80 million program and is seeking other donor support to help make up the difference.

The team benefited from meeting with the IBRD consultant. The consultant advised that due to their low level of traffic, the feeder roads would be a low priority in competing for the available periodic maintenance funds and may not receive much maintenance unless all necessary funds become available. The team is quite certain that all necessary funds will not become available.

Actual maintenance given the roads over the past few years is indicative of what can be expected in the future. The project terminated in 1975-76. Since then Government maintenance expenditures on the feeder roads have been zero in 1976-77; U.S. \$450,00 in FY 1977-78; U.S. \$57,000 in FY 1978-79; and U.S. \$43,000 in FY 1979-80. Much of the \$450,000 expended in FY 1977-78 was used to build retaining walls where slippages had occurred on steep side slopes, and to construct concrete block curb and channel in selected areas where scouring was taking place. Since FY 1977-78, the Ministry of Works has spent an average of \$294 per mile in FY 1978-79 and \$221 per mile in FY 1979-80. Funds for these latter two years were used mostly to pay local labor to perform a little roadside cleaning and pothole repair. However, major maintenance is needed.

The feasibility studies estimated annual maintenance costs for each sub-project which varied from \$350 to \$550 per mile per year (1972 dollars). This estimate did not include the resurfacing costs required about once every 7 years nor did it provide for inflation.

Routine maintenance for these type roads would ordinarily average about U.S. \$800 per mile per year at current prices. Thus, for 194 miles of feeder roads, which includes the Government-funded addition of 13 miles to those which A.I.D. assisted, the proper budget expenditure per year should be about \$155,000. In addition, a new seal coat would normally be required about every 7 years. At an estimated U.S. \$15,000 per mile, this would require an additional expenditure of roughly U.S. \$2.9 million every 7 years for the 194 miles of feeder roads. The 1972-73 roads normally would be due for resurfacing now at an estimated cost of \$408,000. Thus, \$568,000 should have been budgeted for 1979-80 to cover the resurfacing required as well as the routine maintenance for the 194 miles.

However, since many of the roads have deteriorated due to inadequate drainage and insufficient maintenance, much higher maintenance sums will be necessary to preserve the roads. A detailed condition survey would be necessary to arrive at this sum.

The team was impressed with the fact that the Ministry of Works makes annual reviews of the roads and is aware of their condition. But it apparently cannot afford to act upon its knowledge. On the other hand, there is no evidence to indicate that the Mission either called for a sufficient maintenance plan to start with nor followed the issue sufficiently in recent years. As a result of all this, the project is a sharply deteriorating asset in several instances.

2. Impact on Private Contractors

As reviewed in Attachment 1,* contractors worked on only 34 miles of the project as opposed to half of the original 325 miles planned for the project. Seven contractors were involved of which only two are still in the road-building business. Performance standards apparently were unusually strict and no allowance for inflation was permitted. Rather than helping strengthen the local construction industry, the project inadvertently helped to greatly weaken it by holding contractors to fixed prices in a highly inflationary period.

3. Subsequent Feeder Road Construction

Prior to A.I.D.'s feeder road loan, the Ministry of Works had no specific program to improve or build feeder roads. During the four-year project life between April 1972 and March 1976 \$18.8 million was devoted to the feeder road program, \$12.6 million for actual construction costs. Since the project ended, the Ministry has continued to construct and maintain feeder roads, but at a much lower rate of work: only 33 miles of road have been constructed or improved. Expenditures have been as noted below:

	<u>New Construction</u>	<u>Maintenance</u>	<u>Miscellaneous</u>	<u>Total</u>
FY 1976-77	\$ 1,654,000	\$ 0	\$ 439,000	\$ 2,093,000
FY 1977-78	860,000	450,000	230,000	1,540,000
FY 1978-79	276,000	57,000	66,000	399,000
FY 1979-80	<u>745,000</u>	<u>43,000</u>	<u>126,000</u>	<u>914,000</u>
Totals for				
4 years	\$ 3,535,000	\$ 550,000	\$861,000	\$ 4,946,000

Miscellaneous covers such expenditures as land acquisition, consultant fees, economic group, surveys, compensations, etc.

Note: Government's Fiscal Year begins on April 1 and ends on March 31.

* Pages G-5 and 6 of this Appendix

The team did note some new feeder road construction in one location reportedly being pursued under CIDA financing. But for all intents and purposes, feeder roads are considered a low priority now. Given the team's conclusions on the economic and other worth of this project, the Government's priorities are probably quite correct.

4. Impact on the Government of Jamaica

The project did bring together a planning team which held great promise. Cooperation between ministries was good and relatively quite efficient.

The Ministry of Works was a target for particular institutional help. Attachment 1 of this Appendix discusses the particular improvements instituted through the project and their current status. In brief, the project was a useful experience for the staff of the Ministry, helped expand its force account capabilities, furnished it with a significant amount of equipment, provided useful training but an ineffective computerized management information system. Much of this enhanced capability has been well maintained (see, for example, Attachment 2 of this Appendix which discusses the current condition of the equipment furnished under this project), but it has been used in recent years in carrying out the priority task of the road work of the Ministry: primary and secondary roads. The consultant, TAMS, placed the blame on A.I.D. for this shift in stating in its final report:

As a result of the increase in manpower, technical skills and construction equipment which has been developed in the Ministry of Works and Communications in connection with the project, the Ministry is well equipped for future implementation of rural roads projects for which there is a great need in Jamaica.

In view of the success of the project, it was hoped that the disbanding of the project work force would have been avoided by successful negotiation between the Government of Jamaica and the Agency for International Development of a successor project. The experience and momentum which had been achieved on the project would have been carried over into the successor project and used to maximum advantage. (p. 62)

The team does not agree with TAMS. It is more of the opinion that feeder roads were an unusual activity for the Ministry and that the support of one donor should not have been determining as to whether the Ministry continued work on that segment of roads. In any case, the Ministry was strengthened in that part of its work which is given higher priority: primary and secondary roads.

Attachment 1

Institutional Improvements to the Ministry of Works

Institutional objectives of the project included:

1. The development of the capability of road construction contractors in Jamaica.
2. The improvement of the effectiveness of the Ministry of Works and Communications through:
 - a. Training
 - b. Preparation of organizational and procedural manuals
 - c. Development and implementation of a computerized construction management information system.

The training aspect of the project was considered extremely successful. The operational and procedural manuals were prepared by the U.S. consulting engineering firm, but at present only a few have been distributed on a selective basis throughout the Ministry of Works. Others will be distributed as employees learn to use them. The other institutional attempts did not measure up to expectations. Little if any improvement was made in increasing the capability of the local contracting industry, and the construction management information system never did become operational. Separate discussions follow on each of these institutional attempts.

Development of Contractor Capability

One of the institutional objectives stated in the Loan Paper was the development of the capability of road construction contractors in Jamaica. From 1972 to 1974 there was very little contractor activity because of minimal response to public invitations. Those that did respond were not considered qualified to perform the work or could not obtain the necessary bonding. However, during 1975 and 1976, there were 34 miles of feeder road built by 7 contractors. These contractors were small one man operations only 2 of which are still in the road building business in Jamaica. All of the 7 contractors apparently lost money on their contracts, and one of the contracts ended up being finished through funding from the bonding company which had provided the guarantee for completion.

Although poor management can nearly always be attributed to poor contractor performance, and no doubt can be done so in this case,

there were two specific problems that the small contractors were unable to cope with:

1. The contracts did not contain escalation clauses, and the period of contract work was one of high inflation.
2. Previous inspection of contract work had not been rigid in Jamaica and contractors were allowed to produce work which did not measure up to specifications. However, during the feeder road contracts, the U.S. engineering firm stressed strict compliance with specifications. And, of course, contractors had based their bids on the past methods involving a low degree of quality control.

In conclusion, the project did not contribute to developing the capability of road building contractors in Jamaica. Further, it should be noted that performance guarantees are much more difficult to obtain at present than they were during the period from 1974-1976. Thus, small, one man operations are less prevalent at this time.

It should be noted that bridges and masonry work for culvert headwalls and wingwalls for the feeder roads were all constructed by private contract. However, this had been and still is normal practice in Jamaica, and increasing capability in this area was not intended as a needed institutional objective.

Training

The training aspect of the feeder roads project was found to be the most successful, as well as important, institutional achievement. All engineers and technicians interviewed throughout the Ministry of Works were highly complimentary of the training provided by the U.S. consulting engineering firm. Training throughout the project involved classroom instruction, on-site training, and day-to-day advisory assistance on all phases of feeder road operations such as planning, financing, design, construction supervision, operation and maintenance of equipment, quality control and materials testing, and maintenance. After completion of the feeder roads project, those trained were immediately transferred to projects of high priority and many to positions of greater responsibility.

In addition, 20 equipment operators and mechanics were sent to the North East Technical Institute near Scranton, Pennsylvania, U.S.A. Upon returning to Jamaica, those trained assisted in training other operators and mechanics. Incidentally, 19 out of the 20 who were trained in the U.S. still remain in the Ministry of Works.

Operational Manuals

The following manuals were prepared by the U.S. consulting engineering firm for the Ministry of Works:

- Volume 1, Operations Manual, Force Account Construction
- Volume 2, Operations Manual, Contract Construction
- Volume 3A, Quality Control, Road and Bridge Construction - Field Inspection
- Volume 3B, Quality Control, Road and Bridge Construction - Material Control
- Volume 4, Quality Control, Building Construction - Field Inspection and Material Control
- Volume 5, Maintenance of Rural Feeder Roads

The U.S. consultant submitted drafts to the Ministry of Works who then reviewed the drafts and submitted changes to the consultant on Volumes 1 through 4. These volumes were printed in final and 50 copies of each were provided the Ministry of Works. The draft of Volume 5, Maintenance of Rural Feeder Roads was referred to the World Bank funded consultant who was performing a highway maintenance study for the entire country. This consultant, now in the implementation phase of the World Bank maintenance program, has prepared a maintenance manual covering all classes of road. Portions of the draft manual prepared with A.I.D. funds were used in preparing this overall maintenance manual.

Only Volumes 1 and 3A have been partially distributed throughout the Ministry of Works. In discussions with Ministry personnel, it was found that widespread distribution of the five volumes in final has not been made because most mid-level employees for whom the manuals are intended do not know how to properly use them. If the manuals were distributed, they would probably be misplaced and lost. Training sessions are being conducted, and the manuals will continue to be selectively distributed as top management gains more confidence in the various individuals.

Construction Management Information System

After the feeder roads project was underway, the U.C. consulting engineering firm suggested to the Ministry of Works (MOW) that they

undertake the development of a Construction Management Information System known as CMIS, a project specific system which would be designed to improve the efficiency of construction through improved monitoring and control. At the request of MOW to A.I.D., a provision was incorporated into amendment number 1 of the engineering contract for funds to develop and implement such a system.

This system was placed under the responsibility of the Management Information System Section under the Ministry of Works. This section was initially established in early 1972 to perform payroll operations and has since expanded into several other computerized operations to include accounting for equipment rental, road maintenance expenditures and overall budgetary monitoring. The U.S. engineering firm provided two people to act as advisors within the section for 18 months each during 1974 to 1976. One was a computer systems analyst and the other a cost accountant. It might be noted that this was the first time for both of these people to advise a foreign government on such a system. The Government provided 4 computer analysts to be trained. All training was accomplished in Kingston.

After the computer program was developed, the system was applied to sub-projects 4 and 16. However, information provided from the system proved to be of little value to the various sections of MOW that were responsible for constructing the feeder roads. This was due primarily to two problems:

1. The design section of MOW failed to provide in a timely manner the basic inputs necessary for the system to function.
2. There were bugs in the computer program which resulted in inaccuracies in the printout information.

Nevertheless, an attempt was made at producing monthly reports hoping that better input data would be provided and that the bugs would be worked out. However, this did not prove to be the case. Occasional information reports were produced until the completion of the two sub-projects, but these reports were usually several months too late to be of any real value. Along with what meager information they contained, the users became uninterested and the system was temporarily terminated in March 1976. About 6 months later, after the engineering advisory contract was terminated the Management Information Systems Section tried to revive the CMIS on their own and with verbal consent from the rest of MOW, they applied the system to 2 projects on the primary road network. However, they were faced with the same kinds of problems that previously occurred and the system was abandoned. Since then the CMIS has been discussed at meetings and at present there is an effort within MOW to reestablish it.

Incomplete CMIS reports were produced in November and December of 1979 for two projects on the primary road network. More complete reports for these projects are due in April 1980. The Management Information Systems Section believes that the CMIS can be revived if top management, which so far has been lukewarm towards it, decides to support it strongly. There has been some indication that this might result.

It should be noted that 3 of the 4 computer analysts trained by the engineering consultant have since left government service for higher paying jobs in Jamaica. Thus if the CMIS is revived, it is likely to be ineffective since there is only one man who is completely familiar with it. Several additional computer systems analysts would be necessary and it is unlikely that they could be employed at the present salary scales.

In summary, one can conclude that little or no institutional value resulted in attempting to establish a computerized Construction Management Information System.

Attachment 2

Equipment Capability Since Feeder Road Program

A.I.D. loan funds totaling \$1.7 million were used to procure equipment primarily for new construction. This equipment started arriving in 1974 and was phased into the various feeder road construction projects. The A.I.D. equipment accounted for approximately 20 percent of the total equipment owned by the Ministry of Works at that time. Presently most of the equipment is still in operation and currently composes about 35 percent of the Ministry's total equipment, **which has been** recently augmented with U.S. \$2.0 million in maintenance equipment from a World Bank loan. The reason for the increase from 20 percent to 35 percent is because most of the Ministry's older equipment owned prior to 1974 is now out of service. Since a large portion of the current equipment is for maintenance, the A.I.D. procured equipment accounts for about 55 percent of the Ministry's equipment used for new construction. At this time, most of the equipment used for force account construction is located on four arterial projects. It should be noted that about 40 percent of the total force account equipment currently in use on the four projects is rented equipment.

The following is a list of the major units of equipment procured under the loan and its current status as provided by the Ministry's Division of Electrical and Mechanical Services:

Description	Number Procured	In Operation	Under Repair	Out of Service
Crawler Tractor D7	6	6	0	0
Track Loaders	9	8	1	0
Loader with Backhoe	3	3	0	0
Motor Grader	6	4	1	1
Farm Tractor	9	3	6	0
Grit Spreader	4	4	0	0
Base Paver	2	2	0	0
Roller-3 wheel, 12/14 tons	2	2	0	0
Roller-3 wheel, 8/10 tons	2	2	0	0
Roller Pneumatic, 14 tons	2	2	0	0
Vibrating Roller, 8 tons	1	0	1	0
Compressor 150	8	5	3	0
Mobile Workshop	1	1	0	0
Supervisory Vehicle (Scout)	8	2	0	6
Ford Pick-up	2	1	1	0
Biterner Distributor	2	0	1	1
Guesher (small) Mobile	1	1	0	0
Tractor and Trailer	1	0	1	0
Compressor 600cf	1	1	0	0
Sheepfoot Roller	2	2	0	0
Mobile Biterner Heater	1	0	1	0
TOTAL	73	49	16	8

Taken from the chart above, the deadline rate excluding the sheepfoot rollers and "out of service" equipment is 25 percent. Given the age of the equipment, this is not an excessive deadline rate compared with those of most developing countries. The International Scout supervisory vehicles proved to be unsuitable for use on the rough roads in rugged terrain. Six of the original 8 are out of service. Only 2 pieces of major equipment in addition to the International Scouts are out of service. In conclusion, this is a good report on equipment.

The World Bank and Inter-American Development Bank are trying to steer the Ministry of Works away from force account construction. They believe that the Ministry's efforts should be applied to preservation of the existing highway system. Another World Bank loan for procurement of maintenance equipment and spare parts is in process.

APPENDIX H

ENGINEERING ANALYSIS

ENGINEERING ANALYSIS

This appendix consists of four parts:	Page
1. Technical Description of the Project	1
2. Current Conditions of Examined Roads	3
3. Technical Analysis of Standards Used	9
4. Labor Utilization During Construction	11

1. Technical Description of the Project

Technical considerations for the Feeder Roads Project were structured around serving small farmers in the rural, mostly mountainous, areas of Jamaica. Thus, every effort was made to design the roads to the lowest standards possible considering future maintenance requirements and adequate serviceability. Or expressed another way, the idea was to optimize the three variables of road building, i.e., initial construction costs, maintenance costs and user costs. Although the standards actually used reflect such an optimization in many ways, the problems of drainage and the extravagant use of bituminous surfacing in the flat to rolling terrain were not thoroughly explored during the formulation stages of the project. These problems are discussed in 3, below -- "Technical Analysis of Standards Used".

Four different Ministries of the Government of Jamaica participated in the project. The Ministry of Works and Communications had the prime responsibility for implementation of specific projects under the loan. Two new sections were organized in this Ministry to carry out the project: one to administer the planning and financial aspects and the other to handle the construction implementation. Since the project terminated, these sections have been abandoned. However, two engineers are currently involved in feeder road construction. Also, the Ministry of Works and Communications assumed responsibility for maintenance of all roads constructed under the project. Even though many of the roads had been tracks or low quality marl (weathered limestone) surface roads under the Ministry of Local Government or the Ministry of Agriculture, these ministries had no capability to maintain such improved roads.

The Ministry of Finance was responsible for overall inter-ministerial coordination of the project and for the preparation of

feasibility studies and provided initial identification of tract roads under their authority which needed improvement.

The Ministry of Local Government provided initial identification of those roads under their authority which needed improvement.

All four participating ministries had membership on a Route Selection Committee which convened throughout the selection process.

A U.S. consulting engineering firm was retained under the loan by the Government of Jamaica to (1) serve as advisors on technical, financial, procurement, and economic and agricultural justification matters and through an amendment to the contract to (2) improve the highway organization through training, preparation of organizational and procedural manuals and development and implementation of a computerized Construction Management Information System for control of the feeder roads program as well as future programs. (See Appendix G for an analysis of the institutional efforts, a few successful, others not so successful.)

The original plan in the Loan Agreement called for the construction of 325 miles of feeder roads over a 3-year period beginning in June 1972. However, after the project began, the surfacing standards were upgraded and coupled with inflation, the amount of mileage targeted had to be changed to 200. The project started on schedule and was completed in March 1976. The 200 miles target was not completely achieved. Total mileage constructed was 181.3 miles. The Government has since added about 14 miles to this figure on their own. Two sections of the original 200 miles were found by feasibility analysis to be infeasible. Most of the work was reconstruction and improvement of existing tracks; 8.97 miles of new road were constructed.

While it was originally envisaged that half of the total mileage would be constructed by force account and half by local contractors, it was found that contractor response to published invitations was minimal, and, consequently, the majority of the roads would have to be force account constructed. Only 34 miles of the 181.3 miles were constructed by contract. See Appendix G, page 3 for a discussion of the project's impact on local contractors.

In order to expedite the work, contracts were made with local consultants for both surveying and geometric design. This action, combined with the ability of the Ministry of Works to perform more force account work than originally anticipated, resulted in a very good rate of progress in spite of the poor showing by local contractors.

The average cost of the roads was about \$70,000 per mile. This amount is not considered unreasonable in view of the standards constructed and prevailing costs at the time.

Also included in the program was the purchase of U.S. \$1.7 million in construction equipment to augment the existing equipment of the Ministry of Works. This equipment was phased into the various feeder road sub-projects as it arrived and, when the program ended, was moved to other force account work, mostly on the arterial system. Most of the equipment is still operable. See Attachment 2, Appendix G. Procurement was performed by the U.S. Bureau of Public Roads under participating agreement with A.I.D.

The project was originally intended to employ as large a labor force as possible. It should be noted, however, that equipment performed the major portion of work. See 4, below for a discussion on labor utilization.

Since the feeder roads were completed, poor drainage has caused considerable deterioration and expenditures for maintenance have been insufficient to properly maintain them. See 2, below which rates and describes the condition of 84.5 miles traversed by the evaluation team. Appendix G-1 provides a current look at the maintenance picture since the roads were completed.

No major environmental consequences of a detrimental nature were observed during the road inspection. However, some minor consequences which are common to road construction could have been mitigated so that many localized problems would have been avoided. See Appendix F.

2. Current Conditions of Examined Roads

Road Inspection

Out of 181.3 miles constructed under the feeder roads program, the evaluation team drove over 84.5 miles and the team engineer observed the road conditions and assigned a rating to each section. See attached chart. In summary, 10.4 miles were rated EXCELLENT meaning no maintenance other than a small amount of roadside cleanup is needed. 36.3 miles were rated GOOD meaning that a small amount of surface maintenance as well as roadside cleanup is needed. 19.1 miles were rated FAIR requiring a large amount of pothole repair, roadside cleanup and ditch and culvert cleaning. 18.7 miles were rated POOR meaning major reconstruction and/or resurfacing is needed.

Several bridges were observed and one was found to have scoured badly at the piers and abutments. Major repair work is necessary for this bridge.

Out of the 84.5 miles of roads observed, 18.6 miles were constructed by private contractor and the remaining 65.9 miles were constructed through government force account. The contract work appeared to be in better condition receiving ratings of EXCELLENT and GOOD with the exception of 6.4 miles which were flood damaged.

It should be noted that all mileage rated EXCELLENT is located in the St. Elizabeth area which is characterized by gentle rolling terrain, low rainfall and good subgrade soils. Roads in the worst condition are located in the Port Maria area which is characterized by rugged terrain, high rainfall and average subgrade soils.

List of all feeder roads constructed under U. S. Agency for International Development program from 1972 - 1976 all roads inspected during this evaluation are rated under observed condition column as:

EXCELLENT -- No maintenance other than roadside maintenance needed

GOOD -- Minor surface deterioration -- some maintenance needed

FAIR -- Occasional potholes -- in need of immediate maintenance

POOR -- Large sections of base exposed, raveling, scouring, etc.

-- reconstruction and/or resurfacing needed.

Subproject	Name and Location	Length miles	Year(s) Constructed	Observed Condition
1	<u>Cambridge I</u>			
	GUILSBORO BRIDGES		1972-1973	
	GUILSBORO-SOMERTON	1.7	1972-1973	GOOD
	GUILSBORO LAND SETTLEMENT	4.1	1972-1973	POOR
2.	<u>Cambridge II</u>			
	FLAGSTAFF-SHAW CASTLE	1.4	1972-1973	
	SHAW CASTLE-SILVER GROVE	1.2	1972-1973	
3.	<u>Christiana I</u>			
	WIREFENCE-WARSOP	3.9	1972-1974	
	ALLSIDES-ROUTE 1	2.4	1973-1974	
	ALLSIDES-ROUTE II	2.4	1973-1974	
4.	<u>May Pen I</u>			
	SANDY RIVER-JAMES HILL	5.9	1972-1974	POOR
5.	<u>May Pen II</u>			
	KUPIUS-BECKFORD KRAAL	3.1	1973-1974	
	PALMYRA-BOGLAND SETTLEMENT	3.3	1973-1974	
	CROOKED RIVER-BRAE HEAD	3.5	1973-1974	FAIR
	PENNAUTS DANCE	4.1	1975-1976	FAIR
6.	<u>May Pen II</u>			
	KELLITS LAND SETTLEMENT	0.9	1973-1974	
	KELLITS-COME SEE AND BURN	3.4	1974-1976	
	McNIE-DOUGLAS CASTLE	3.4	1975-1976	POOR
	KELLITS-McNIE	1.7	1975-1976	FAIR

Subproject	Name and Location	Length miles	Year(s) Constructed	Observed Condition
7	<u>Linstead</u> Pear Tree Grove Land Settlement	1.3	1974 *	
	(c) Rio Mango-Crawle II	2.3	1975-1976	GOOD
	(c) Rio Mango-Springfield	3.8	1975-1976	GOOD
8	<u>Grange Hill I</u> Grange Hill-Friendship	4.0	1974	
9	<u>Grange Hill II</u> Prospect-Kingsvale	4.3	1974	FAIR
10	<u>Santa Cruz I and II</u> Newell-Hunslow	4.9	1974	GOOD
	Round Hill-Flagaman	1.3	1974-1975	GOOD
11	<u>Claremont II</u> Lime Hall Land Settlement	5.0	1974-1975	
12	<u>Port Maria IV</u> Springfield-Decoy	2.5	*	
	Decoy House-Donnington	2.4	1974-1975*	POOR
13	<u>Port Maria II</u> Heywood Hall-Whitehall	1.3	1974-1975	FAIR
	Whitehall-Come See	1.0	1974-1975	POOR
	Heywood Hall-Islington	1.7	1975-1976	FAIR
14	<u>Santa Cruz III and IV</u> Southfield-Rose Hall	4.3	1974-1975	EXCELLENT
	(c) Big Yard-Top Hill	1.8	1975	EXCELLENT
	(c) Corby-Epping Forest	2.5	1975-1976	EXCELLENT
	(c) Bellevue-St. Marys	1.8	1975-1976	EXCELLENT
15	<u>Grange Hill III</u> Mt. Eagle-Rock Spring	11.3	1974-1975	GOOD
16	<u>Port Maria III</u> Nutfield-Robbins Bay	2.5	1974-1975	FAIR
	Mt. Pleasant-Green Castle	0.9	1974-1975	
	Nutfield-Manimee Bay	2.8	1975-1976*	
	Nutfield-Pimento Hill	1.3	1975-1976	

Subproject	Name and Location	Length miles	Year(s) Constructed	Observed Condition
17	<u>Falmouth</u>			
	Dromilly-Dieside	2.2	1974-1975	
	Canaan Land Settlement Road	2.4	1975	
	(c) Parochial Road Thru Unity	3.1	1975-1976	
18	<u>Claremont I</u>			
	(c) Clay Ground-Spring Garden	1.6	1974-1975	
	(c) Blow Fire Hill-Spring Garden	2.3	1974-1975	
19	<u>Christiana III</u>			
	Freetown-Cumberland-Bombay	6.5	1974-1975	GOOD
20	<u>Port Maria I</u>			
	(c) Rio Nuevo Bridge		1975	POOR
	(c) Pembroke Hall-Donnington	1.9	1974-1975*	POOR
	(c) Top Derry-Montreal	4.5	1975-1976*	GOOD
21	<u>Santa Cruz V</u>			
	Thornton-Bethsalem	3.5	1975-1976	
	Whitehall-Bethsalem	0.7	1975-1976	
	Accompong-Whitehall	1.7	1975-1976	
	Jointwood-Cooks Bottom	3.6	1975-1976	
22	<u>Cambridge IV</u>			
	Bog Content	5.4	1975	
	Chocho Valley-Long Hill	3.9	1975	
	White House-Long Hill	0.9	1975	
23	<u>Morant Bay I and II</u>			
	(c) Whitehall-Spring Pen	2.4	1975-1976*	
	(c) Story Gut-Thornton	2.7	1975-1976	
	(c) Citron Valley Land Settlement	1.4	1975-1976	
	(c) Whitehall-Middleton	2.1	1975-1976	
	Whitehall-Thornton	1.6	1976	
	Thornton-Spring Hill	1.7	1976	
24	<u>Port Antonio II</u>			
	Alligator Church-Bellevue	3.0	1975-1976*	
25	<u>Cambridge III</u>			
	Bickersteth-Mt. Horet	1.7	1975-1976	
	Richmond Hill Land Settlement	3.1	1975-1976	

Subproject	Name and Location	Length miles	Year(s) Constructed	Observed Condition
26	<u>Christiana II</u>			
	Freemans Hall-Lickfield	3.6	1975-1976	
	Freemans Hall-Stettin	0.9	1975-1976	
	Campbell Town Road	0.8	1975-1976	
	Wirefence-Campbell Town	1.0	1975-1976	
	TOTAL MILEAGE	181.3		
	Mileage rated	84.5		

(c) Constructed by Contractor

* Indicates Flood Damaged

3. Technical Analysis of Standards used on Feeder Road Project

The loan paper stated that most roads would be constructed to gravel surface (marl) standards except where steep gradients were experienced in which case a double bituminous surface treatment (DBST) would be used. Roadbed widths (traveled way plus shoulders) varying from 16 feet to 30 feet were envisioned depending upon the road's class and estimated traffic volume in ten years. Incidentally, much higher average daily traffic (ADTs) were envisioned for the feeder roads during preparation of the Loan Paper than will probably ever exist. The paper discusses building roads to geometric standards suitable for over 200 ADT in ten years and under 200 ADT in ten years.

The design standards contained in the Loan Paper were modified by the Consulting Engineer, and the revised standards were approved by A.I.D. One set of standards was used for all the feeder roads. These standards were to accommodate an ADT of up to 100 vehicles. While actual traffic counts were not available, it was believed, and correctly so, that traffic on these roads would never increase much beyond 100 ADT. Thus, it was decided to construct the roads to minimum geometric standards with consequent low-design speeds but higher than normal structural standards in order to reduce future maintenance costs. However, as discussed further herein, requirements for drainage were under-designed, and this inadequacy has caused deterioration of many roads in rugged terrain with consequent needs for immediate major maintenance and repair.

The geometric standards dictated a traveled way of 12 feet with shoulders constructed in the fills and shallow ditches constructed in the cuts. This resulted in a roadbed width of 20 feet, thus allowing vehicles to pass at a slow speed by pulling off of the traveled way. All roads were covered with a bituminous surface (DBST on traveled way, SBST on shoulders) to prevent exorbitant maintenance costs which is common to gravel-surfaced roads in heavy rainfall areas. However, because of inadequate drainage, the bituminous surface on many roads has potholed and deteriorated. A maximum grade of 12 percent was allowed except where existing grades exceeding 12 percent would be too expensive to correct.

Structural design, which was to accommodate a maximum axle load of 9 short tons, consisted of a 6-inch sub-base as required (CBR 30-40), a 6-inch base course (CBR 80) and a Double Bituminous Surface Course. The sub-base and base were carried through the shoulders which were covered with a Single Bituminous Surface Course. Incidentally, observations showed many shoulders in which the SBSC had deteriorated and weeds had grown up on the shoulders to the point where only the traveled way was visible.

In retrospect, the design standards proved to be inadequate from the standpoint of drainage requirements. Also, the decision to place a bituminous surface on all the feeder roads throughout the island, regardless of conditions, can be questioned.

Roads in the mountainous areas are subject to intense rainfall with water gushing down the entire surface of the road. Large ditches in the cut sections should have been designed to accommodate the rainfall and allow several inches freeboard from the bottom of the base course material. In addition, many more culvert cross-drains should have been used to remove the water from the cut section side.

The decision to use a bituminous surface on all feeder roads regardless of location does not appear to be economical. In the St. Elizabeth area, subsoil conditions are excellent, terrain is gently rolling and rainfall is not intense like it is in the mountainous areas. Thus, a gravel surface (marl) road should have been considered. By leaving off the bituminous surface, such roads could have been constructed for about 40 percent less cost. And with proper maintenance, they should provide functional service.

The justification for a bituminous surface on the roads in the mountainous areas appears justified if adequate drainage had been exercised. It should be noted that there is very little bank-run gravel surfacing material in Jamaica but there are plentiful supplies of marl (weathered limestone). Marl is used for both base and surfacing but erodes very quickly when exposed to water. Thus, when used as surfacing, it would have a one to two-year life in mountainous areas of heavy rainfall. However, because of inadequate drainage, the bituminous surface roads are not holding up. Although a bituminous surface is considered somewhat extravagant for any road under 1-- ADT, it was believed that it could be justified on the basis of preventive maintenance. Gravel surface roads as contrasted with bituminous surface roads require two echelons of maintenance; one of a routine nature including roadside cleaning and frequent blading to clear the drainage channels and reshape the road and restore the material that has been thrown out to the sides; the second, required approximately every 4 to 6 years, but of a very expensive nature, whereby the entire layer of gravel surface is replaced. This latter maintenance requires major construction for a country such as Jamaica. Thus, bituminous surfacing is believed justified for the mountainous areas to protect the underlying components of the pavement structure which would probably be lost in a year or two. Of course, bituminous-surfaced roads require a new seal coat about every seven years, but this is much less costly than maintaining a gravel road in which the surface erodes away every two years.

In summarizing the surfacing standards, if adequate drainage had been exercised, the decision to use bituminous surface on the feeder roads in the mountainous areas is considered justified. However, the bituminous surface is an extravagant expenditure in the rolling to flat terrain of less intense rainfall. Again, the major inadequacy of the roads is poor drainage.

For the bituminous surface roads in mountainous areas, with incorporation of adequate ditches and cross drains, the shoulders could probably be narrowed to 3 feet each. This would reduce the roadbed width from 20 feet to 18 feet, thus helping to offset a portion of the additional costs involved in providing for adequate drainage standards. Although passing would be constricted to the bare minimum, the 18 foot roadbed would be acceptable for the low traffic volumes observed during the inspection.

Also relating to standards is the issue of culvert size. About two-thirds of the 24-inch diameter culverts in the Port Maria area were observed to be stopped up. These stoppages appeared to have been initiated by limbs and debris, first clogging the culvert thus allowing siltation to easily occur. Therefore, in mountainous areas where there are sources of such debris, as banana trees, it is suggested that larger culverts, 30 inches - 36 inches, be used which are not so easily clogged. Although culvert stoppage is also a function of inadequate maintenance, the small additional costs for larger diameter culverts has definite advantages considering the practical aspects of the restraints on maintenance expenditures.

When a Double Bituminous Surface Treatment is put down, it is important that the right amount of asphalt be used. If too much asphalt is used, it will act as a lubricant rather than a binder and the surface will bleed and distort. In addition, the larger stone used for the first application should be properly choked with smaller stone so that an interlocking action occurs with the aggregate. During inspection, observation revealed that both too much asphalt and poor gradation existed, mostly on the roads constructed by force account. Thus, improved quality control is necessary for the bituminous surfacing operations.

4. Labor Utilization During Construction

One of the major objectives of the project was to employ the maximum number of people in the shortest possible time, and thereby ease the pressure of widespread unemployment. Rural feeder roads were chosen from two priorities considered labor intensive, the other being afforestation.

It should be noted that no evidence could be found during the interviews which might suggest that true labor intensive construction was ever really considered during the initial stages of the project. In other words, consideration was never given to the types of methods or designs whereby labor could be utilized for the major items of work which conventionally are performed by equipment. Rather, a program was planned and implemented that was equipment intensive but yet allowed for employment of labor to perform many of the incidentals and minor items of work. For example, equipment was used for excavation, embankment, pit excavation for base and sub-base material, hauling base and sub-base material, compaction, crushing stone for the bituminous surfacing and application of the bituminous surfacing. Labor intensive methods were used for excavation for culverts, installation of culverts, jackhammer operation for blasting, extracting boulders from the base and sub-base material, fencing where required, masonry work for retaining walls and culvert headwalls and wingwalls, and much of the bridge construction. In summary, labor was used to perform the types of work which are normally best performed by labor on equipment intensive jobs throughout the developing world.

At the outset of the program, the policy was to employ labor on a two weekson -- two weeks off basis so as to provide as many people as possible with jobs. However, after the program was about half over, some laborers had developed skills or proved to be better workers than others, and full time employment became more the rule with less numbers involved. It was the practice to obtain labor near the vicinity of the project so that they could return home at nights. Employment, outside of MOW permanent employees, on each sub-project throughout its construction varied between 20 and 40 laborers depending on the kinds of work that were underway at any one time. During the height of all feeder road construction during 1974 and 1975, about 500 laborers were employed.

In terms of maximizing labor input, the project was improperly designed from the outset. However, in terms of minimizing road construction costs, the mix of labor and equipment used appears appropriate. From 1972 to 1976, labor wages on road construction varied from U.S. \$5.30 to U.S. \$6.00 per 8-hour day. World Bank studies show that this is too high a wage to economically perform excavation and embankment. Further, the average haul distance for marl base and sub-base was 6 miles. Again, this distance is uneconomical for movement of the material by labor methods even at much lower wage rates. In addition, the project could never have been completed in three and a half years if labor had been utilized to perform any of the major items of work.

In summary, the evaluation team does not believe that labor employment was explored in any degree of depth during preparation of the Loan Paper or in further planning stages. Although frequent reference is made to employment and labor intensive methods in the Loan Paper, progress reports and other relevant material, an analysis was never performed to analyze trade offs in labor and equipment as affecting costs and time periods of construction. Thus, the evaluation team submits that the objective and meaning of labor intensive construction was vague from the beginning of the project to its completion.

APPENDIX I

• A.I.D. ROLE - LIST OF MISSED OPPORTUNITIES

A.I.D. ROLE - LIST OF MISSED OPPORTUNITIES

Listed below is a chronology of opportunities A.I.D. had to review the programmatic and developmental significance of the project. These were missed opportunities.

- In 1971 an excellent design team from what was then the acknowledged leading bureau in A.I.D. did not probe the political rationale of the project (which might have provided an education for the Embassy) nor did it take steps to design into the project assurances that the employment goals would be met.
- In 1972 a series of fatal mistakes were made by agreeing both to an engineering standard far above that originally designed and warranted as well as by changing the basis of conducting economic feasibility studies for the sub-projects. The result was a pyramiding of inappropriate analyses leading to unjustified selections and over-built roads.
- Placing the A.I.D. supervision under a Mission engineer (and the absence of a loan officer, agricultural officer or economist in the Mission staff) almost assured that the developmental goals of the project would not receive much attention during implementation.
- By 1973 it was clear that the employment effects were not materializing. Changes in approach could have been instituted.
- In mid-1974 an A.I.D. Latin America Bureau professional questioned (internal LA Bureau memorandum) the rote nature of the sub-project feasibility studies (as per example, Appendix C) and suggested that the time had come for an evaluation of the project to see if the correct feasibility methodology was being employed. No action was taken on this recommendation.
- In late 1974 an internal report to the Jamaican Government questioned (McCullough, op cit) if the project could be expected to produce the predicated benefits unless complementary government actions were undertaken. Such actions

(assuring inputs and a focus on marketing) are in line with the team's views on the best ways to increase income in the project areas.

- In 1974 A.I.D. established a requirement for evaluation of all A.I.D. projects annually.
- The consultant's final report, dated June 1976, stated that, "The U.S. A.I.D. Mission in Kingston will implement a routine follow-up inspection of all sub-projects in order to observe completed construction, maintenance procedures, and the changes in the socio-economic aspect of the improvement area."
- By 1977 A.I.D. had not evaluated the project. The first reference to consideration of evaluation of the project occurred in 1977. The Mission decided to defer any evaluation work on the project since peak benefits were expected to take place five years after implementation. The Mission said the first possible evaluation could take place in 1978. Even if this dubious thinking had been conscientiously accepted, substantial evaluations could have been carried out in 1978 on the 1972-73 roads and in 1979 on the 1974 roads.
- The first evaluation work on the project (by either A.I.D. or the Government of Jamaica) was that undertaken by this study in March, 1980.

SPECIAL STUDIES

- No. 1: The Socio-Economic Context of Fuelwood Use in Small Rural Communities (August 1980)
- No. 2: Water Supply and Diarrhea: Guatemala Revisited (August 1980)

PROGRAM DESIGN AND EVALUATION METHODS

Manager's Guide to Data Collection (November 1979)

